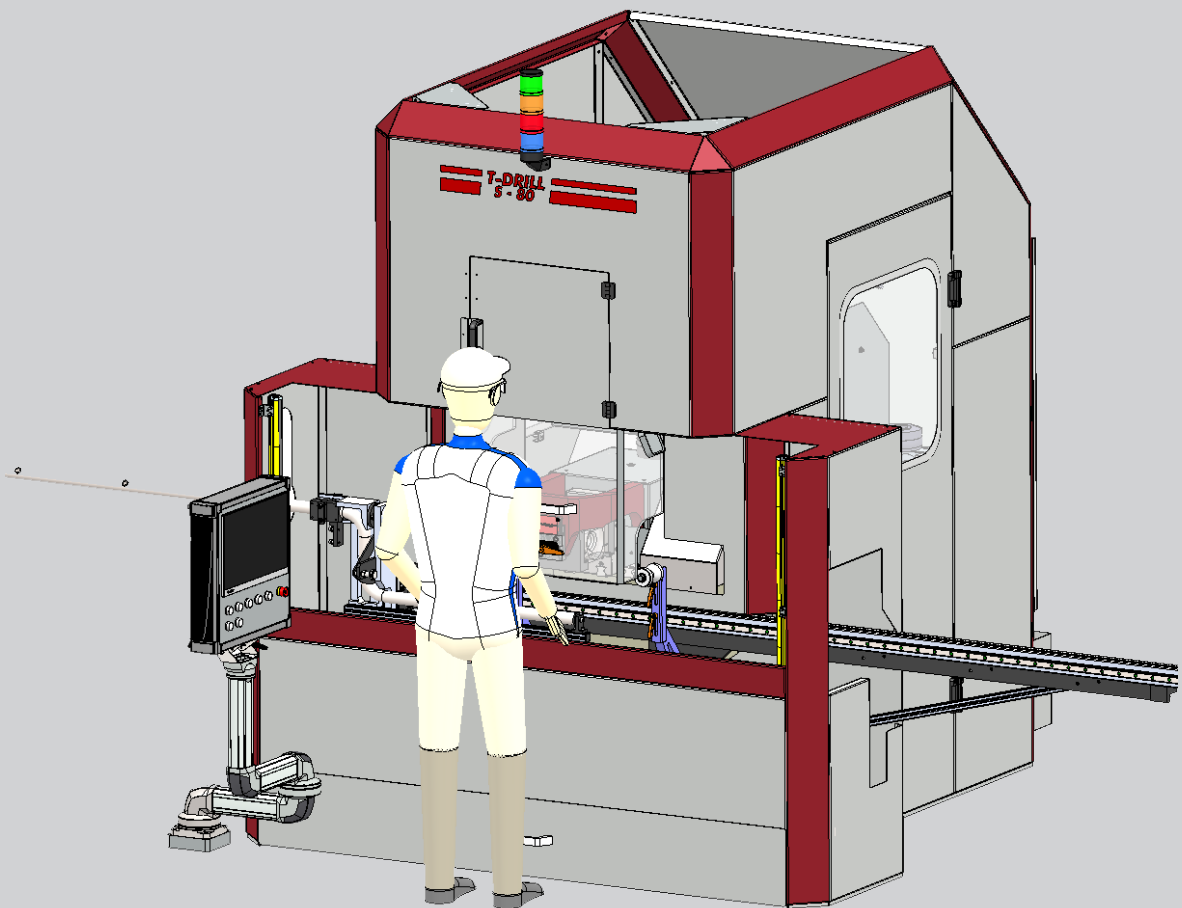


# T-DRILL

PRODUCTIVITY AS A PRODUCT.

## INSTRUCTION MANUAL



**COLLARING MACHINE**

**S-80**

## Version

5340418EN  
27.06.2018 / MT

## Original instructions

### PRELIMINARY EDITION

Instructions for the use and maintenance of the T-Drill Collaring machine S-80.

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It has been our aim to elaborate this instruction book with the greatest possible care and attention. The accuracy of the information has been carefully checked during the preparation of the manual. Should any subsequent modifications be made to the product, we decline liability for erroneous or incomplete information.

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## 1. NOTES ON THE USE OF THE INSTRUCTION MANUAL

### 1.1. GENERAL

This manual contains the instructions for use, maintenance and setting of the T-DRILL S-80 Collaring machine.

Before proceeding with the installation or operation of S-80 collaring machine, read the general safety instructions in chapter 2

If the S-80 collaring machine forms part of a system supplied by T-DRILL, then also the general safety instructions related to the other appliances should be studied before use.

➡ **NOTE!** Read all the instructions for the entire operation sequence before proceeding with the installation, operation or maintenance of the machine.

### 1.2. SYMBOLS FOR WARNING AND DANGER USED IN THIS MANUAL

ⓘ **DANGER!** May cause a serious accident or even death if the correct precautions have not been taken.

⚡ **DANGER!** Danger originated from the electrical equipment, which causes or may cause a serious accident or death, if the correct precautions have not been taken.

➡ **NOTE!** May cause an accident or damage property, if the correct measures have not been taken. This symbol is also used to generally emphasize a particular detail.

**IMPORTANT!** Gray base color is used to emphasize an important detail.

### 1.3. SYMBOLS AND WARNINGS USED IN THE TCC-28 MACHINE



Read the instruction manual attentively before carrying out installation, operation, setting or maintenance of the machine.



Electric box. Danger may be caused by electric installation.



Sharp edges!  
Be extremely cautious when handling this area of the machine.



Don't look into the pipe during the process relating to the collar.



Don't put your hands on the tube line under the machine or in the end of the machine during process.



Mind the rotating tool.



Warning! Moving parts. Be extremely cautious when handling this area of the machine.



Use hearing protector when operating with the machine.



Use safety shoes when handling pipes and the tools of the machine.



Use protective glasses when operating with the machine.



Always use protective gloves when handling the tools - the cutting edges and the lubricant used may cause wounds and inflammations.

## 1.4. PERSONAL PROTECTIVE EQUIPMENT FOR THE OPERATOR

Always wear the appropriate personal protective equipment, and use extreme caution when operating the machine.

The local safety guidelines and regulations are to be followed for safe operation. The T-Drill instruction manual will not repeal the federal, state and local regulations.



Use overalls when operating the machine.

## 2. GENERAL SAFETY INSTRUCTIONS

Read the instruction manual attentively before installation, operation or maintenance of the machine.

The T-DRILL S-80 is to be used only for collaring in the specific way as described in this manual.

When operating the T-DRILL S-80 it must be fastened on the floor.

Do not exceed the capacity of the machine.

Before removing or mounting a collaring head or a clamp, the electric current supply must be disconnected by pushing the power OFF (O) button in the front panel.

Disconnect power before carrying out any maintenance or repair inside the machine.

Do not keep any loose objects or tools on the machine.

Make sure the ventilation is sufficient.

Always use protective glasses when using the S-80 unit.

Always wear protective gloves when handling the collaring tool.

Study also the safety data sheet concerning the lubricant which is supplied with the machine.

When pressing the Emergency switch (STOP-button) all functions of the S-80 collaring machine are immediately interrupted.

After installation of the machine and before using the functions of the S-80 collaring unit, carry out the measures described in chapter "start-up checking".

➔ **NOTE! Always keep this instruction book at hand for any future use.**

## 3. GENERAL INFORMATION ON S-80 COLLARING MACHINE

### 3.1. INTRODUCTION

The construction of the unit consists of the covers, collaring machine body, spindle, a clamping mechanism and positioning table.

The machine body and the spindle absorb the collaring stress. The feed stroke of the spindle is servo controlled, which assures the achievement of an optimal efficiency and a great precision. The spindle rotation is accomplished by means of a timing belt, directly by the driving motor.

The S-80 collaring machine has safety devices in accordance with the CE requirements.

All this to guarantee that the T-DRILL S-80 unit is reliable even in heavy duty industrial use.

### 3.2. THE PURPOSE OF THE MACHINE

The S-80 unit is designed for extrusion of collars to straight and bent tubes (using the Manual feed table).

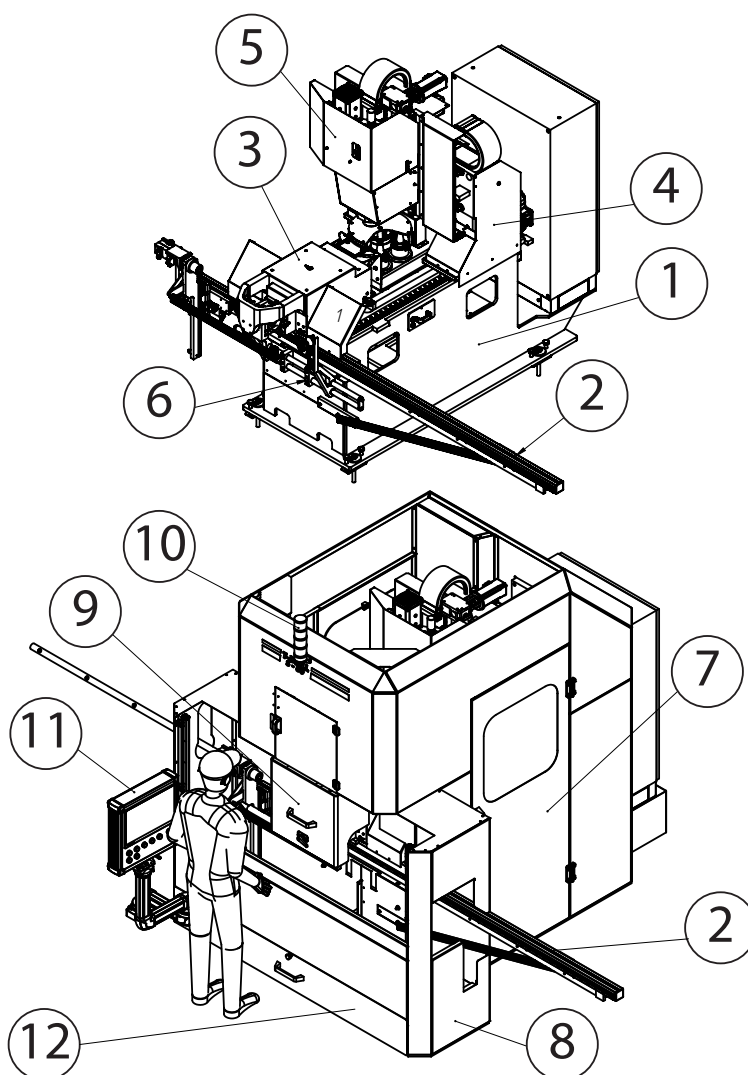
### 3.3. TECHNICAL SPECIFICATIONS

Type	Unit	S-80 collaring machine	NOTE!
Type code		40231	Manuf. no. 118028
Max. run tube O.D.	mm	114,3	
Max. collar O.D.	mm	88,9	
Max. wall thickness of run tube	mm	3.05	SCH10
Compressed air supply	bar	6	
Compressed air consumption	l/min	70	
Connected power	kW	5	see machine plate
Fuse sizes	A	3 x 32 A (max)	
Operating voltage		3 x 400 V / 50 Hz	see machine plate
Weight of the unit	kg	2200	
Weight of the electric cabin	kg	110	
Weight of the machine cover	kg	330	
Front cover (with trash drawer)	kg	150	

1 bar = 100 kPa



## 3.4. MAIN PARTS OF THE MACHINE



1	Machine main frame
2	MFT Manual Feed Table (Optional equipment)
3	Clamping unit
4	Moving frame (slide set and frame)
5	Spindle
6	Tube support
7	Covers and doors
8	Front cover
9	Chip shield
10	Warning beacon
11	Control panel
12	Oil and chip tray (another oil tray is located inside the machine frame)

## 3.4.1. TECHNICAL FEATURES OF MAIN PARTS

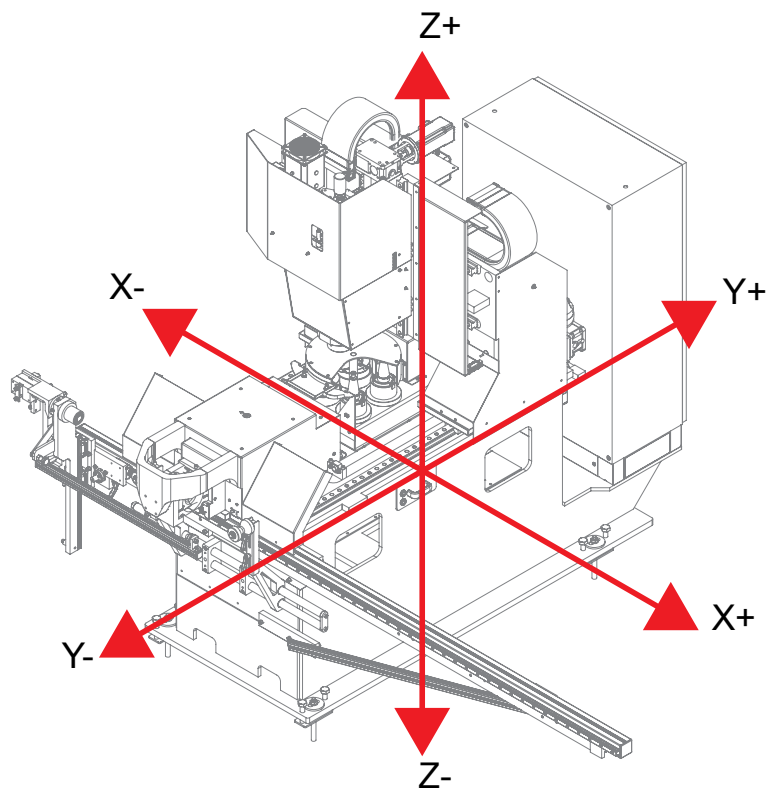
### Clamping device :

- Self-centering clamping device
- Stroke 2x65mm
- Total clamping force 14,7kN

### Tool change unit :

- Programmable tool change using x,y,z movements
- Tool breakage monitoring
- Tool in position sensors
- Chip cover for tool magazine

## 3.5. AXIS DIRECTIONS OF THE MACHINE



### Main movements:

#### X-axis:

- Stroke +85 / - 85mm
- Speed max. 10 m/min (~166 mm/s)
- Holding brake (~40kN lin. force)

#### Y-axis:

- Stroke +945 / - 45mm
- Speed max. 10 m/min (~166 mm/s)
- Holding brake (~40kN lin. force)

#### Z-axis:

- Stroke 350mm (nose min. ~70mm from center)
- Speed max. 5 m/min (~83 mm/s)
- Motor brake
- Lift force with nominal torque ~50kN (tool taper grip force max.18 kN)

## 4. TRANSPORT, HANDLING AND LOCATION

### 4.1. TRANSPORT AND LOCATION

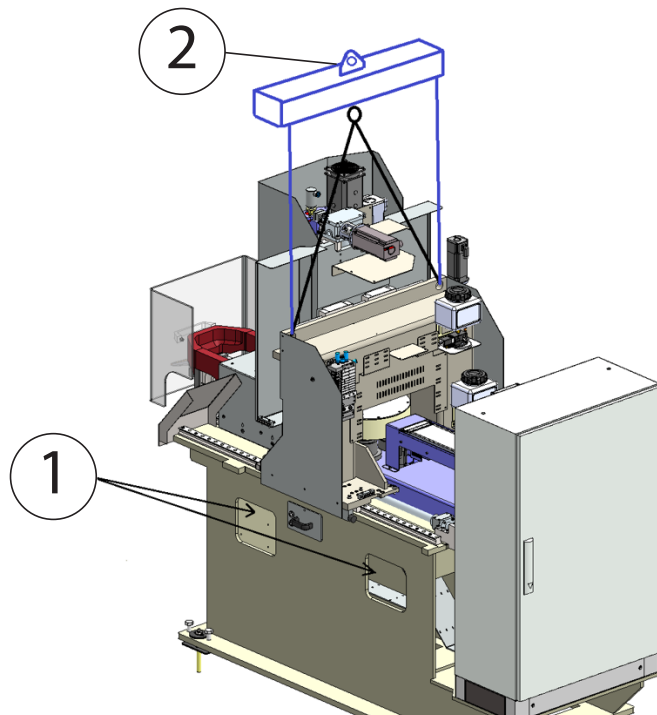
For transport the S-80 is bolted to a wooden pallet and covered with plastic. A waterproof protection is provided for the electric cabinet.

The machine can be stored in a dry place.

➔ **NOTE!** Always keep the S-80 unit in vertical position! Never allow the unit to overturn.

### 4.2. LIFTING INSTRUCTIONS

The machine can be lifted / moved using fork lift truck, or with a crane and lifting chains.



*Lifting the S-80 machine: 1. Use a fork truck: drive the forks through the machine frame holes, ensure that the forks go all the way through the machine frame to the other side!  
2. Use a lift bar and chains or a strap, lift the machine from the lifting lugs attached to the frame.*

**ⓘ When lifting the machine with a fork truck: drive the forks through the machine frame holes, ensure that the forks go all the way through the machine frame to the other side, otherwise the machine may tip over!**

The covers and electric cabin are lifted from the pallet using a crane and lifting straps and chains.

## 5. INSTALLATION

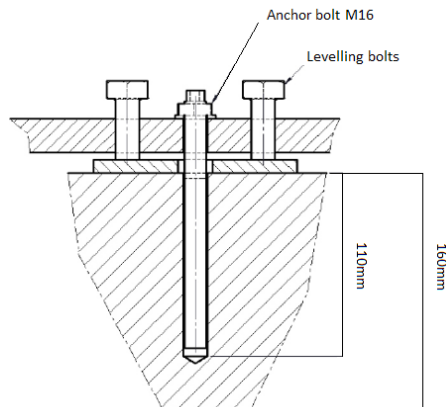
The S-80 should be installed on a level and vibration-free foundation. Leave enough space around the table for operation and maintenance.

### Tools for installing machine:

- Engineers wrench 46 mm, 36 mm, 27 mm
- ER 25VM

Fasten the machine on floor with chemical anchor bolts M16 through machine base plate, secure with M16 nuts. Check machine straightness with a spirit level (or a digital level), adjust with leveling bolts if needed.

The floor under this machine must stand the weight of 1000kg / anchor foot.



*Anchor bolt and leveling bolts. Floor plate fixing: Use chemical anchor bolts M16, Würth W-VD or equivalent. Anchor bolt holes,  $\varnothing 18$ . Secure with M16 nuts.*

### Alignment of the machine

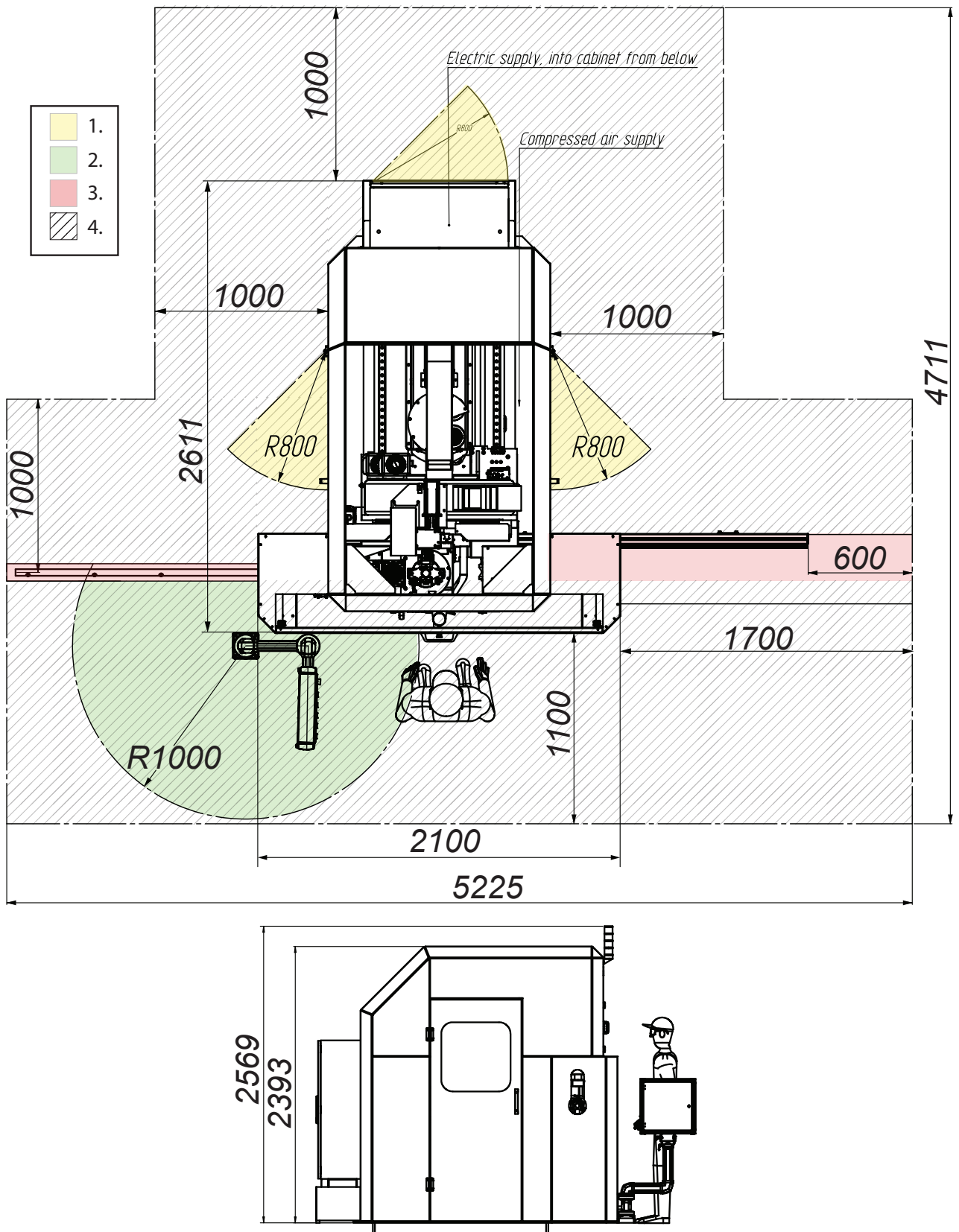
Check the horizontal straightness of the S-80 collaring machine from the Z-carriage slides, using a spirit level. The maximum tolerance is 1 mm/m. Adjust if necessary.

### 5.1. AMBIENT CONDITIONS

The machine must be placed in an working area, the environmental conditions of which do not exceed the following limit values:

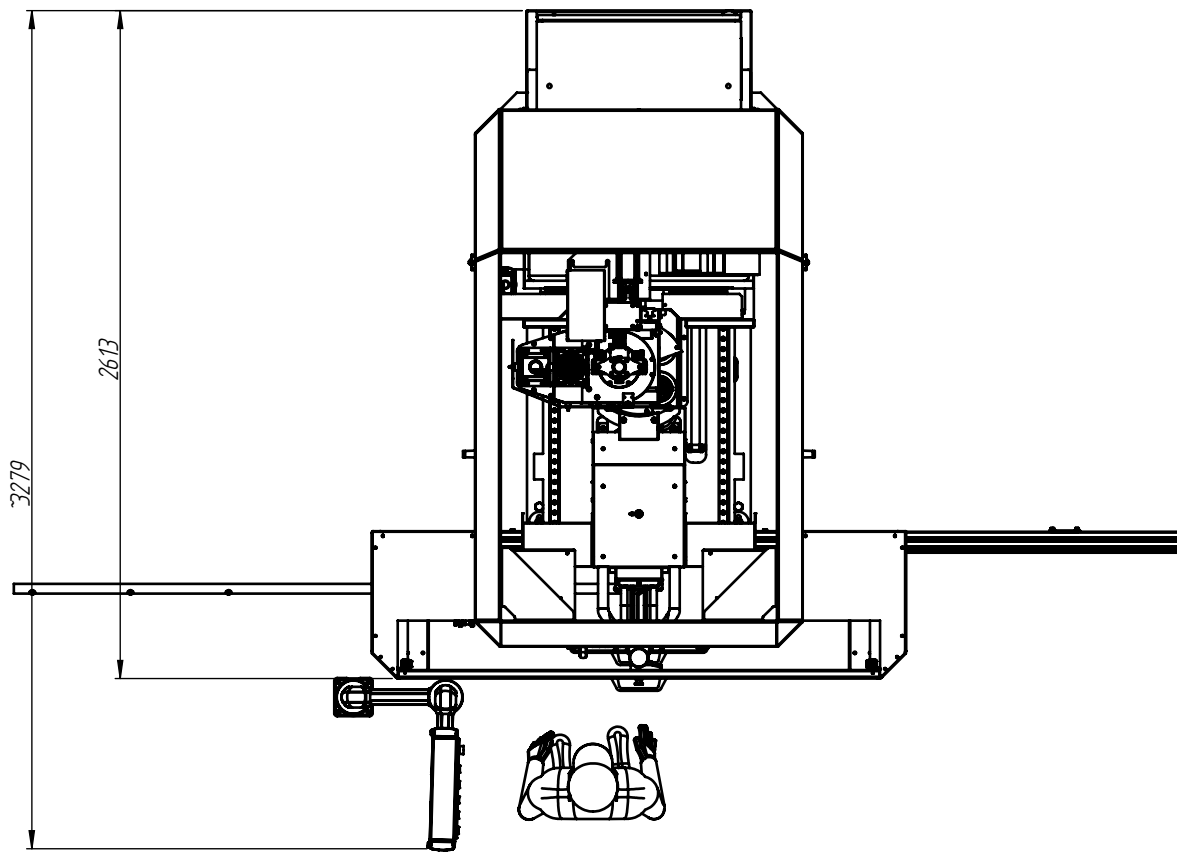
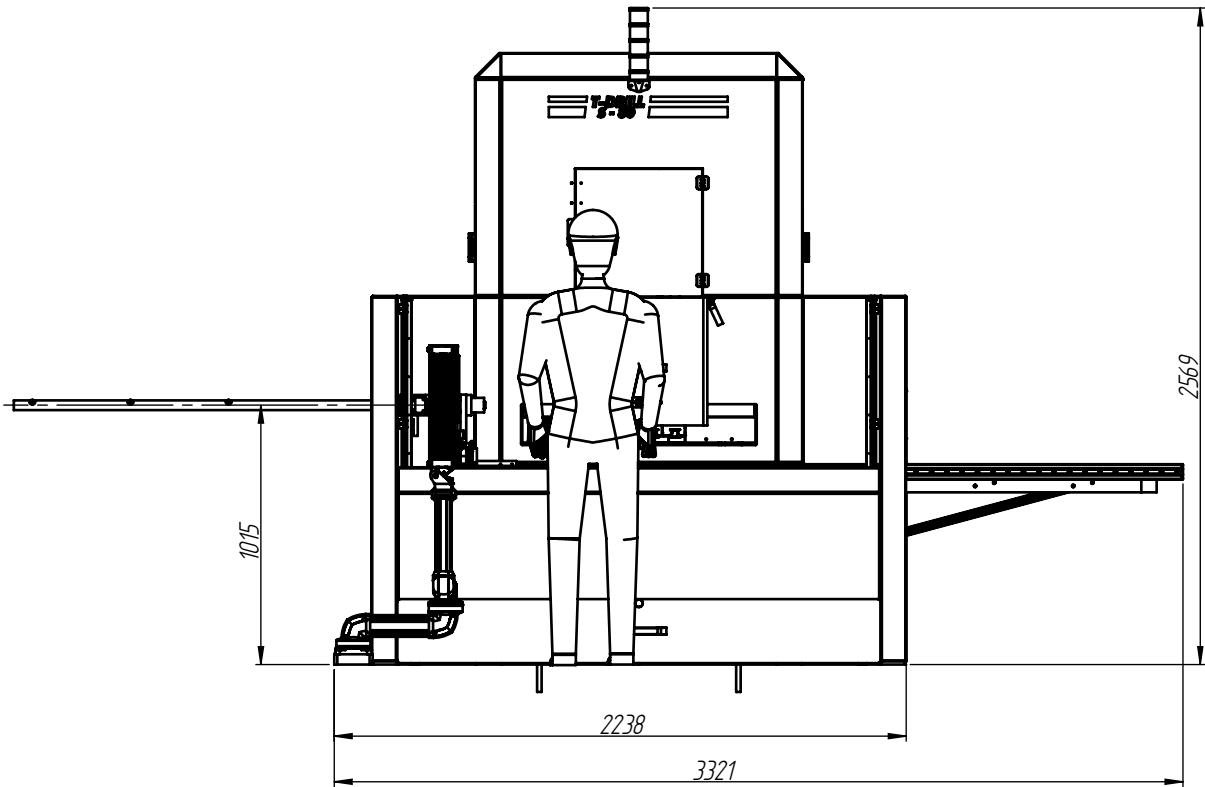
Temperature:	+12,5 °C...+ 40°C
Relative humidity of air:	75% or less
Electromagnetism	The surrounding appliances should not cause such electromagnetic perturbations which exceed the general standards established for workshop machinery.
Altitude:	max. 2200m

## 5.2. LAYOUT OF THE S-80 COLLARING MACHINE



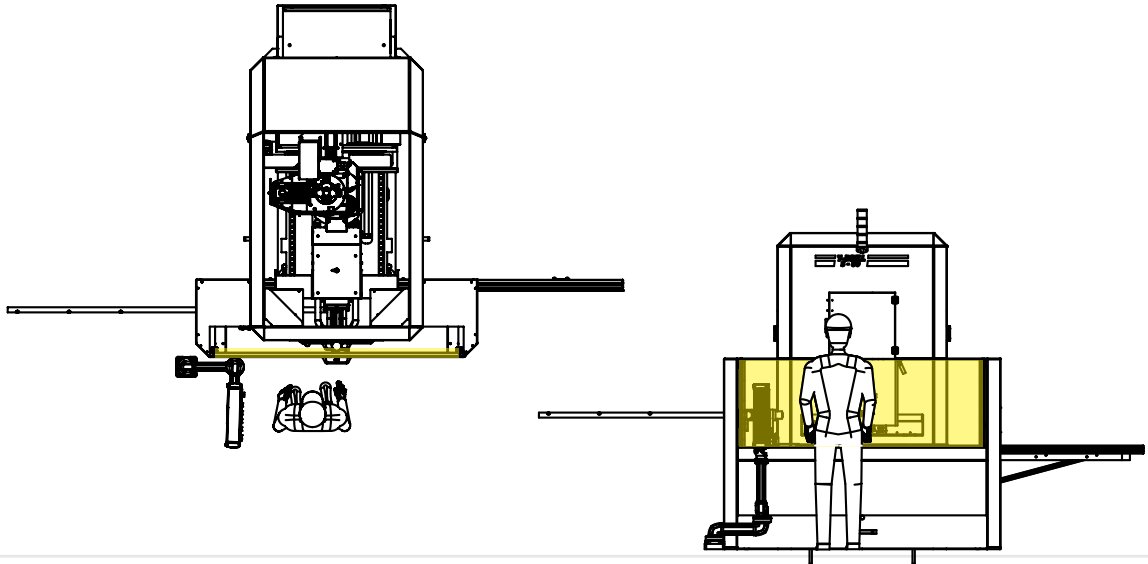
Space requirement for operation and maintenance of the machine. 1. Door opening areas, 2. Display reach area, 3. Tube line, 4. Operator and service area.

# T-DRILL INSTRUCTION MANUAL



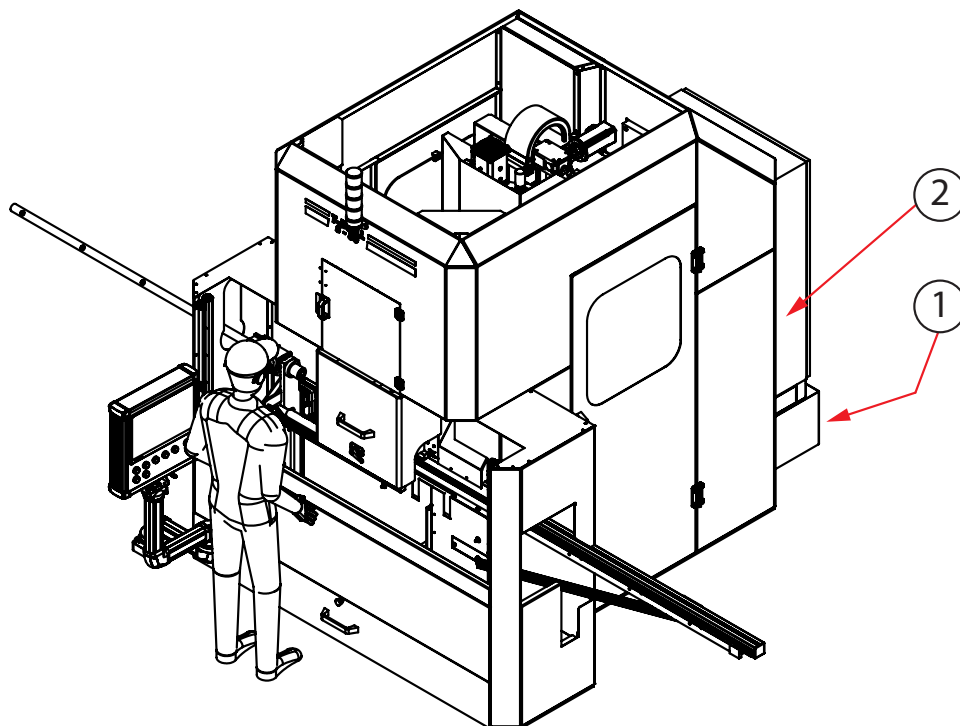
## 5.3. INSTALLATION OF THE LIGHT CURTAINS (OPTIONAL EQUIPMENT)

The light curtains are installed according to layout. For further information: See Datalogic Slim instruction manual, enclosed.



1. Light curtains, marked with yellow

## 5.4. CONNECTION OF THE MACHINE TO THE SOURCES OF ENERGY



1. Electric supply, into the electric cabinet from below, 2. Air supply hose is lead under the covers, to the rear of the S-80 machine (see 5.4.2.)

### 5.4.1. CONNECTION TO THE ELECTRICITY NETWORK

⚡ **DANGER!** Disconnect the electric current to the supply cable before starting to carry out the connection - fatally dangerous voltage.

⚡ **DANGER!** Even when the main switch of the unit is in OFF / (O) position, the switch as well as the supply cable are alive - fatally dangerous voltage.

⚡ **DANGER!** Only a qualified and authorized person is allowed to carry out the connection of the S-80 unit to the mains.

The terminals for connection of the external supply cable to the S-80 unit are placed in the electric cabin. The supply cable is lead under the electric cabin into the cabin.

Special attention is to be paid to correct grounding of the machine. Make sure the operating voltage of the machine corresponds to the supply voltage of the circuit. The machine can be supplied with a voltage of 400 V/50Hz.

Check the correct connection with the help of the circuit diagram supplied with the machine. Compare the diagram with the values on the identification plate of the machine.



### 5.4.2. CONNECTION TO THE COMPRESSED AIR SYSTEM

➔ **NOTE!** The connection of the S-80 units to the compressed air system is to be performed only by a person authorized to this effect by the employer.

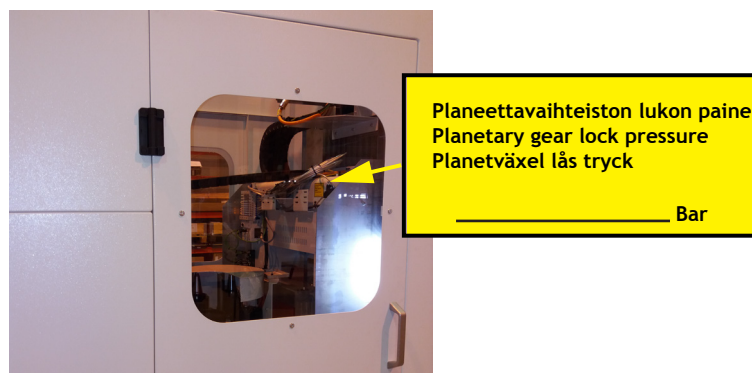
The compressed air is to be connected to a pressure regulator supplied with unit. The pressure regulator is readily assembled and fixed in the correct position. Compressed air supply requirements: 6-9 bar (85-130 psi).

The air supply valve can be equipped with a padlock to ensure safety during maintenance of the machine.

➔ **NOTE!** The clamp speed must not be adjusted, the machine warranty expires if adjusted.



➔ **NOTE!** The planetary gear lock pressure has been adjusted at the factory, do not adjust.



### 5.5. START-UP CHECKING

➔ **NOTE!** Carry out the start-up checking before using the functions of the machine- a wrong voltage may damage the machine.

Before using the machine, proceed as follows:

1. Measure the supply voltage of the machine and check if it corresponds to the voltage and frequency indicated on the identification plate of the machine.
2. Check the air supply. Open the main valve of the machine and set the value of the operation pressure to 6 bar (85 psi).

## 6. THE INTRODUCTION OF THE S-80 COLLARING MACHINE

### 6.1. DESCRIPTION OF THE CONTROL DEVICES

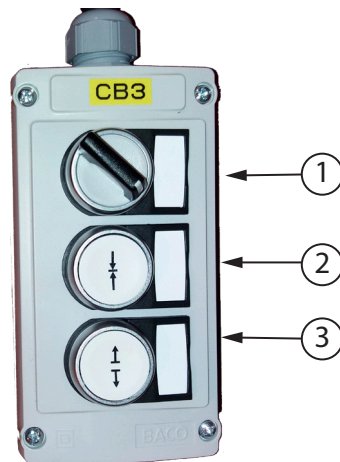
#### 6.1.1. MAIN SWITCH

The main switch of the unit is placed on the electric cabin door. The main switch can be locked with a padlock in order to prevent unauthorized use of the machine.

The power is switched on by turning the main switch to “ON” (I) position. The power is switched off by turning the main switch to “OFF” (O) position.

When the power is switched “ON” the machine “OFF”-button on the control panel is lit red, and the start screen opens to the display.

#### 6.1.2. CLAMP REMOTE CONTROL CB3



*Clamp remote control: 1. Manual control ON-OFF, 2. Clamps close, 3. Clamps open.*

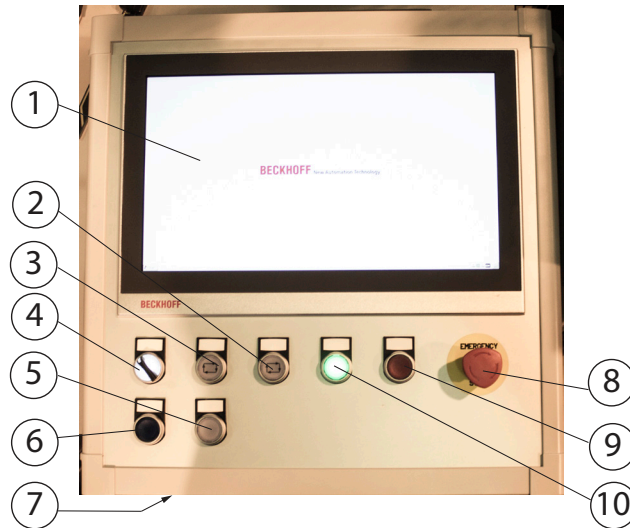
The remote control is for positioning of the tube to the clamps: final clamp tightening is done automatically when the work cycle starts. Turn machine to MANUAL from control panel switch and activate remote control from pendant switch (1).

**ⓘ There is a continuous pressure on the clamp control pneumatic line to keep the tube from falling off the clamps when the emergency stop is pushed!**

The continuous pressure line is marked with signal tape. This certain line is depressurized only when the main air supply is switched off.

➔ **NOTE!** Never use the T-Drill machine USB socket to charge mobile phones or any other devices. The USB connection is only for program upload / download.

## 6.1.3. CONTROL PANEL



1	Touch panel display	Operation modes and adjustments
2	Work cycle STOP PAUSE	Controlled stopping of the automatic work cycle. Push shortly to PAUSE. When on PAUSE of the cycle the pilot lamp blinks. The cycle can be started again by pressing the “cycle start” push-button. If the button is pushed for 2 sec. the automatic work cycle stops completely.
3	Work cycle START	Push to start the automatic work cycle. A pilot lamp signals that the automatic work cycle is on.
4	MAN - 0 - AUTO	
5	Enter the safety area request button	Request to enter safety area. A controlled stopping of the machine to next step of the program.
6	Reset safety curtain button / Reset air pressure supply	The button blue light is not lit, when the machine is ready, power is on, and the safety curtain is activated. Push the button for approx. 1 sec. Reset air supply after Emergency stop, push the button. To make a controlled machine reset, push 10 sec! See troubleshoot!
7	USB-connection. Only for memory stick!	
8	Emergency stop (release by turning)	Stops the machine in case of danger.
9	Machine OFF push-button	Disconnects the control power from the S-80 machine. The PC is on and can be used to program.
10	Machine ON push-button	Puts the cutting machine in state of readiness, switches the control on to the machine. Green light in a pilot lamp is lit.

## 6.2. DESCRIPTION OF THE USER INTERFACE SCREENS

### 6.2.1. START-UP SCREEN

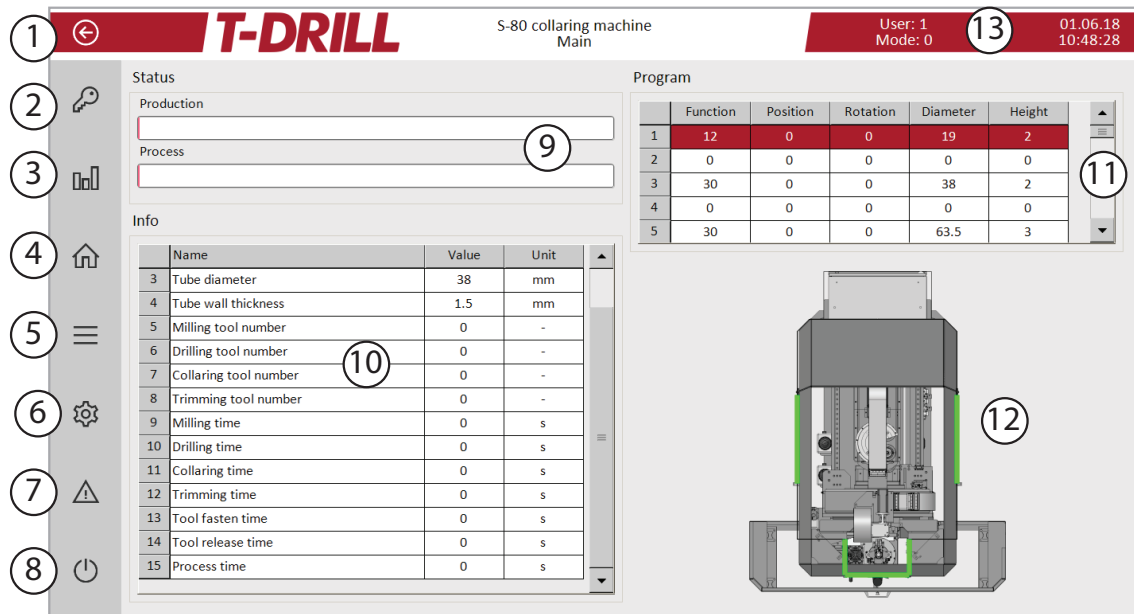
When the power is switched “ON” the start screen opens to the display.



Tap the display to enter.

## 6.2.2. MAIN SCREEN

The main screen is informative only. The fields cannot be edited. When the machine program is running, the screen cannot be used.



1.	Tap arrow button to return to previous screen.
2.	Key-icon - Tap to log on / change user level.
3.	Tap to enter: Bar charts (6.2.2.1.) NOT AVAILABLE
4.	House-icon - back to main screen
5.	Tap to enter Menu-screen (6.2.2.2.)
6.	Settings screen (6.2.2.3.)
7.	Alarms screen: Alarms will appear to this screen. When there are active alarms, the button flashes red. (6.2.2.4.)
8	Stop the S-80 PLC - The PLC closed and the Windows system stays on. Restart the PLC program from the Windows menu on the left, or taskbar on the right.
9	Status bars, show the actual progress of the program.
10	Program information lines: See next page.
11	Current program: The activated, red line is currently running. The program lines can be scrolled through when the program is not running. See next page.
13	Tap user description to change current user password.
12	Machine pictured from top: Safety limit visualization: Red - Doors open, Yellow - Door request, Green - Doors closed and working

### Machine current program information lines:

	Name	Value	Unit
1	Tube material	1	-
2	Tube length	1000	mm
3	Tube diameter	38	mm
4	Tube wall thickness	1.5	mm
5	Milling tool number	0	-
6	Drilling tool number	0	-
7	Collaring tool number	0	-
8	Trimming tool number	0	-
9	Milling time	0	s
10	Drilling time	0	s
11	Collaring time	0	s
12	Trimming time	0	s
13	Tool fasten time	0	s
14	Tool release time	0	s
15	Process time	0	s

1	Tube material	<p>Program information lines cannot be altered on the main screen, this is only informative. These values are set in machine settings.</p>
2	Tube length (feed table information)	
3	Tube diameter: The actual diameter of the tube to be collared	
4	Tube wall thickness	
5	Milling tool number	
6	Drilling tool number	
7	Collaring tool number	
8	Trimming tool number	
9	Milling time	
10	Drilling time	
11	Collaring time	
12	Trimming time	
13	Tool fasten time	
14	Tool release time	
15	Process time	

## Current program information

Program					
	Function	Position	Rotation	Diameter	Height
1	12	0	0	19	2
2	0	0	0	0	0
3	30	0	0	38	2
4	0	0	0	0	0
5	30	0	0	63.5	3

Function	<p>Function number defines what is to be done. Function number 0-9 are reserved for the special commands. From that on the first number indicates how many stages the function has, and the following number indicates what work cycle with this amount of stages is done. For example: Function 30 tells that it has 3 stages and the first work cycle is done as described in the table. Function 12 tells that it has 1 stage and the first work cycles collaring</p>
Position	<p>Only used when the machine is equipped with an automatic feed table. With MFT &amp; manual tube support: just for notes.</p>
Rotation	<p>Only used when the machine is equipped with a tube rotation module. Expression 0-360 degrees. With MFT &amp; manual tube support: just for notes.</p>
Diameter	<p>Diameter of the collar or a round hole. The elliptic pilot hole is defined automatically by the size of the collar.</p>
Height	<p>The height of the collar from the outer surface of the tube. (The outer surface is count from the tube outer diameter divided by 2. The diameter value can be altered by adjusting the offset).</p>

### PAUSE

Put the machine to PAUSE by pushing the "STOP" button quickly, the button will start flashing to inform that the machine is paused. (To switch PAUSE off push "STOP" button again). The machine is in pause mode, if no one is logged in.

### STEP MODE

The step mode is used to run the machine program step-by-step:

Put the machine to PAUSE by pushing the "STOP" button quickly, the button will start flashing to inform that the machine is paused. (To switch PAUSE off push "STOP" button again).

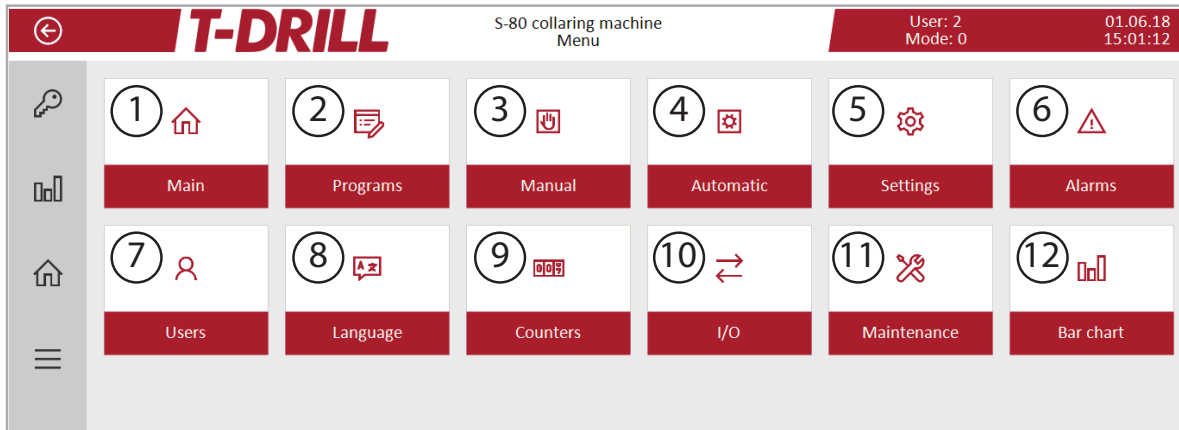
Run the program step-by-step by pushing the "START" button, one push is one step.

## 6.2.2.1. BAR CHARTS SCREEN

NOT AVAILABLE.

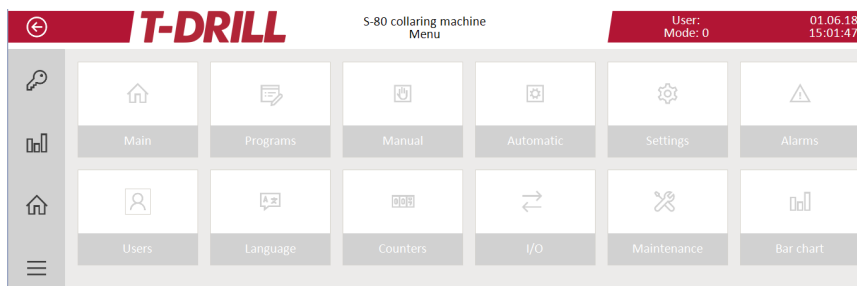
## 6.2.2.2. MENU SCREEN

The available functions depend on user level. Below shown as Supervisor user level:



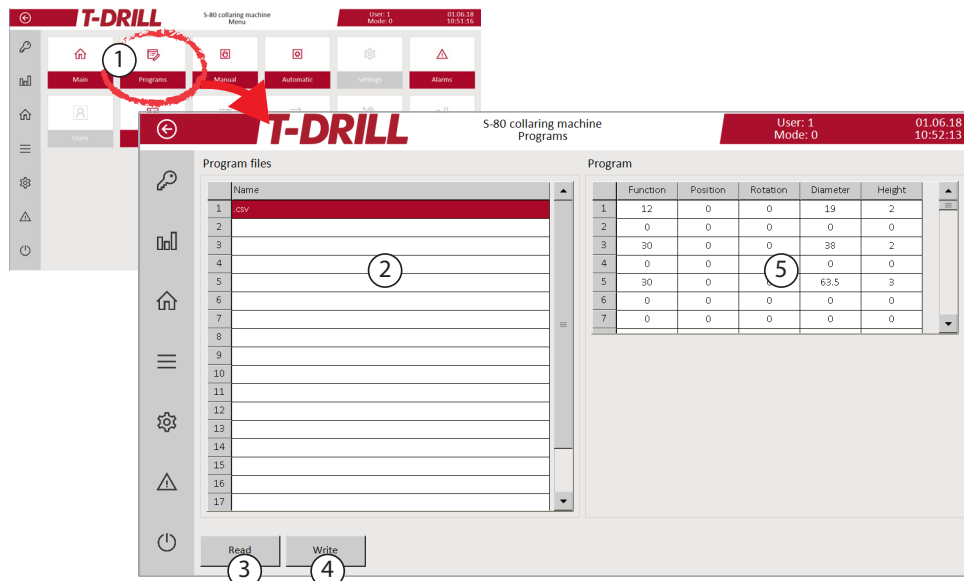
1.	Tap to go back to Main screen
2.	Tap to enter Programs screen: Load, make and edit programs (6.2.2.2.1.)
3.	Tap to enter Manual screen (6.2.2.2.2.)
4.	Tap to enter Automatic screen (6.2.2.2.3.)
5.	Tap to enter Settings screen (6.2.2.3.)
6.	Tap to enter Alarms screen: All alarms will appear to this screen (6.2.2.4)
7.	Tap to enter Users screen: Manage user information (6.2.2.5.)
8.	Tap to enter Language screen: Change display language by tapping a flag on screen.
9.	Tap to enter Counters screen: machine counters list (6.2.2.6.)
10.	Tap to enter PLC data: inputs and outputs (6.2.2.7.)
11.	Maintenance screen (T-Drill service only)
12.	Tap to enter Bar Charts screen (6.2.2.1.) NOT AVAILABLE

**The buttons are dim when the user has no rights:**





## 6.2.2.2.1. PROGRAMS

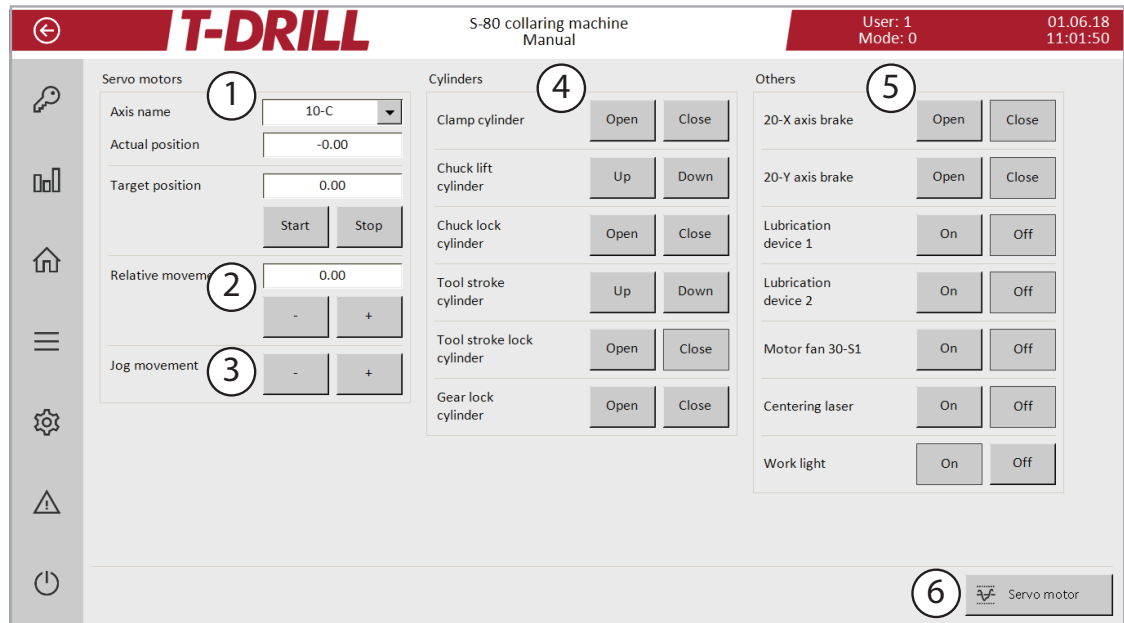


1	Tap to enter program screen	
2	Program file list, downloaded from the computer (predefined location).	
3	Read	Reads the activated line program from the PC to the display
4	Write	Saves (writes) the program changes to the PC
5	Program contents list:	
	Function	<p>Function number defines what is to be done. Function number 0-9 are reserved for the special commands. From that on the first number indicates how many stages the function has, and the following number indicates what work cycle with this amount of stages is done.</p> <p>For example:                      Function 30 tells that it has 3 stages and the first work cycle is done as described in the table.                      Function 12 tells that it has 1 stage and the first work cycles collaring</p>
	Position	Only used when the machine is equipped with a feed table.
	Rotation	Only used when the machine is equipped with a tube rotation module. Expression 0-360 degrees.
	Diameter	Diameter of the collar or a round hole. The elliptic pilot hole is defined automatically by the size of the collar.
	Height	The height of the collar from the outer surface of the tube. (The outer surface is count from the tube outer diameter divided by 2. The diameter value can be altered by adjusting the offset).

### Functions as a table:

Function	1	2	3	4
0	Program end			
1	Pause			
10	Milling (circle)			
11	Milling (ellipse)			
12	Collaring			
13	Trimming			
14	Drilling			
15	Cleaning			
20	Milling	Collaring		
21	Milling	Cleaning		
22	Collaring	Trimming		
23	Collaring	Cleaning		
24	Trimming	Cleaning		
25	Drilling	Cleaning		
30	Milling	Collaring	Trimming	
31	Milling	Collaring	Cleaning	
32	Collaring	Trimming	Cleaning	
40	Milling	Cleaning	Collaring	Trimming

## 6.2.2.2.2. MANUAL SCREEN

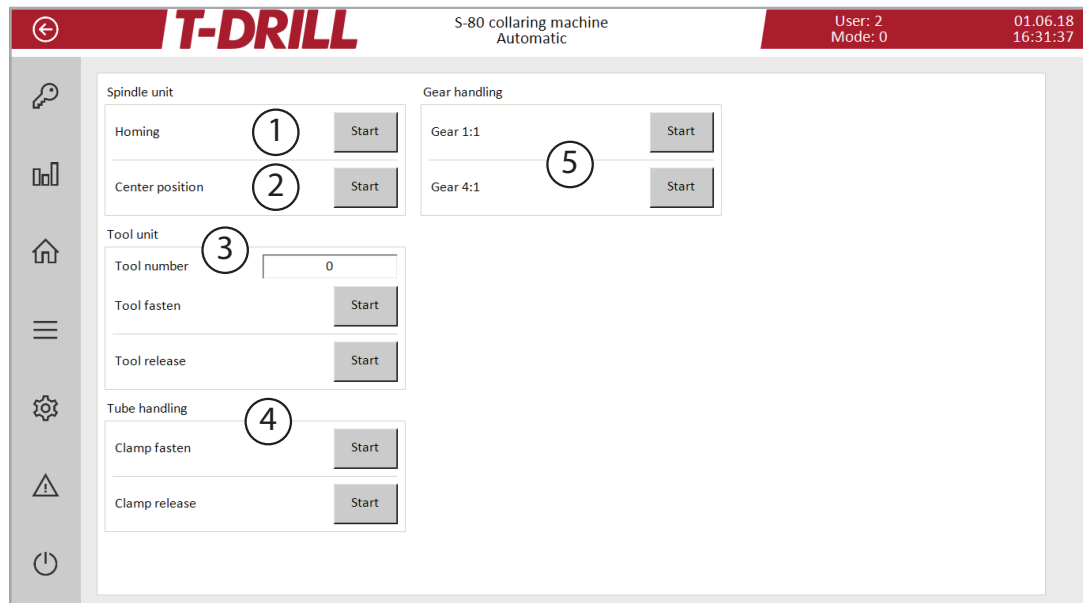


1.	Choose the axis to move from the pull-down menu.	“Actual position” field shows the current position, and the desired target position is written to the “Target position” field. Tap the target field to open keypad. Start button moves the axis to target position, tap Stop button in case necessary to stop before target.
2.	Relative movement	
3.	Jog movement	(+) and (-) buttons move the axis in steps (jog).
4.	Cylinders	Tap button to activate movement / function. Clamp cylinder: open / close Chuck lift cylinder: open / close the tool gripper Chuck lock cylinder: open= S1 inner spindle free, close = lock the tool on place (lock S1 inner spindle) Tool stroke cylinder: To release the tool from the chuck Tool stroke lock cylinder: Gear lock cylinder: open = 1:1 cylinder at rear position and planetary gear is locked. Close = 4:1 collaring ratio
5.	Others	Tap button to activate movement / function.
6.	Servo motors-button	Access Servo motors screen

### S-80 axis list:

Axis name	Movement / function	
10-c=	Cover of the tool magazine	
20-x=	Sideways direction	
20-y=	Depth direction	
20-z =	Up / down direction	
30-S1 =	S-80 inner spindle	
30-S2 =	S-80 outer spindle	

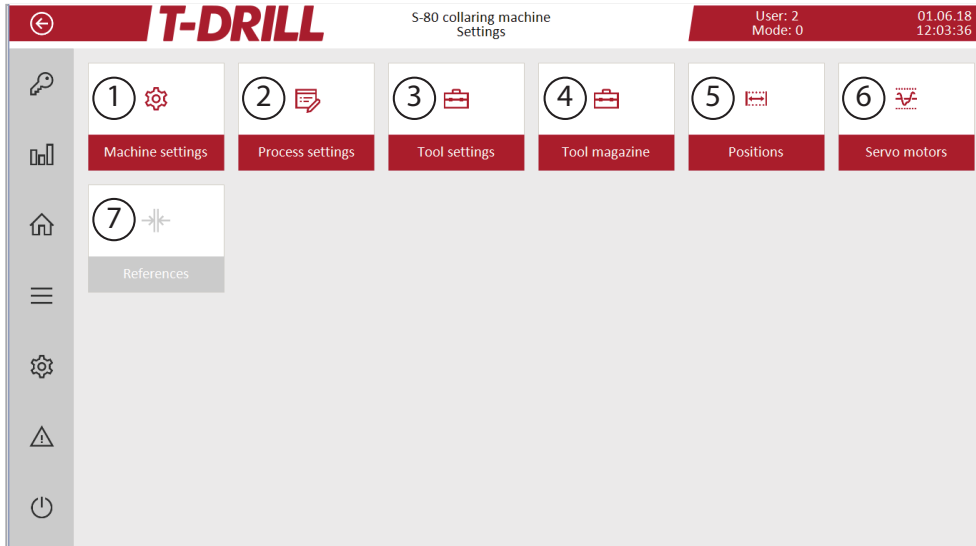
## 6.2.2.2.3. AUTOMATIC SCREEN



1	<p>Do homing by tapping the button: Homing resets all machine axis positions to home position. The homing position is the starting point of the work cycle.</p>
2	<p>Center position: Run the machine to the preset position of the laser beam cross (The collar center point). The position is set on "Positions" screen.</p>
3	<p>Tool unit: Tool number (This has to be set to the tool magazine, tool information can be found on Tool settings screen). Tool fasten, for fastening the tool . Automatic function. Tool release, for returning the tool . Automatic function. <b>See 7.1.1. Collaring tool setup</b></p>
4	<p>Tube handling: Clamp Fasten / Clamp release: Tap button "Clamp Fasten" to run the sequence: the clamp close-sequence is done, clamp is fully fastened and the air pressure is left on. Tap button "Clamp release": the clamp release-sequence is done, clamp is released (air pressure off).</p>
5	<p>Gear handling: Tap either "Start" button to switch gear ratio (Mainly for testing). Tool changing is done on 1:1 ratio, collaring on 1:4 ratio. Homing run switches the gear ratio to 1:1 to enable tool change.</p>

## 6.2.2.3. SETTINGS SCREEN

The buttons are dim when the user has no rights.



Tap to enter:

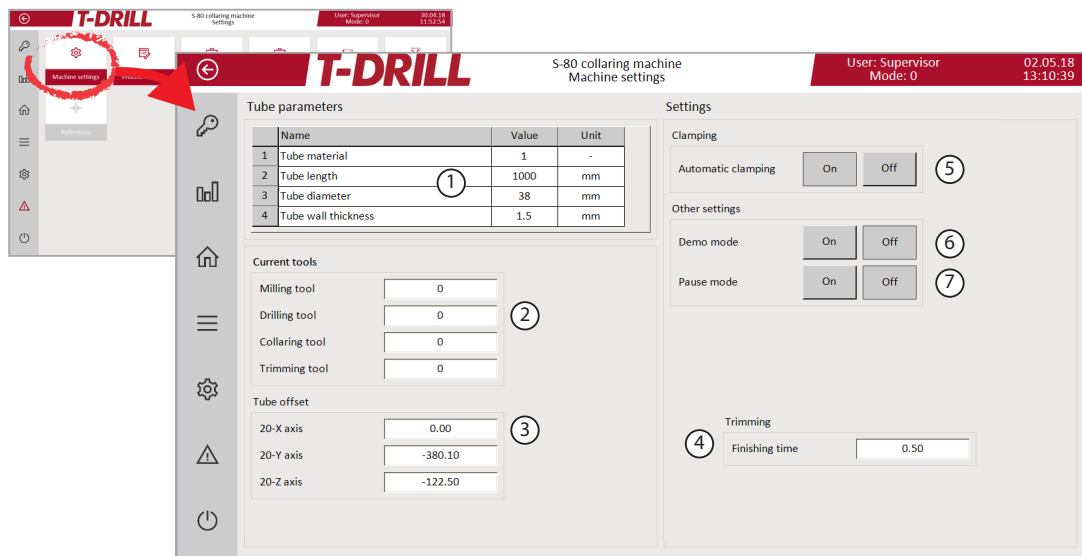
1.	Machine settings	General machine settings (6.2.2.3.1.)
2.	Process settings	Settings for different processes of the machine: Milling, collaring, trimming and drilling. (6.2.2.3.2.)
3.	Tool settings	All tool settings (6.2.2.3.3.)
4.	Tool magazine	Tool magazine holder and position settings (6.2.2.3.4.)
5.	Positions	Machine position settings (6.2.2.3.5.)
6.	Servo motors:	Adjustment parameters for the servo motors (6.2.2.3.6.)
7.	References:	Set axis references (6.2.2.3.7.) T-Drill service only

*The buttons are dim when the user has no rights.*

## 6.2.2.3.1. MACHINE SETTINGS

For Supervisor or Maintenance user level.

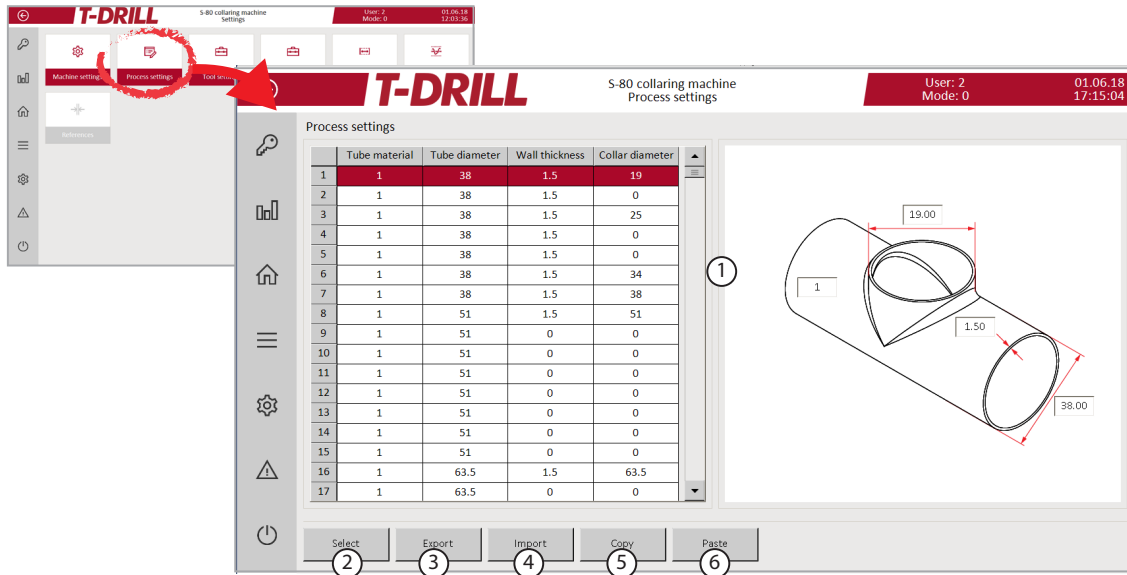
This page has general machine settings: When the tube size changes, all of the tube information is set here, and the machine is able to collect machining data from the Process settings screen corresponding parameters.



1.	<b>Tube parameters</b> <table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1 Tube material</td> <td>1</td> <td>-</td> </tr> <tr> <td>2 Tube length</td> <td>1000</td> <td>mm</td> </tr> <tr> <td>3 Tube diameter</td> <td>38</td> <td>mm</td> </tr> <tr> <td>4 Tube wall thickness</td> <td>1.5</td> <td>mm</td> </tr> </tbody> </table>	Name	Value	Unit	1 Tube material	1	-	2 Tube length	1000	mm	3 Tube diameter	38	mm	4 Tube wall thickness	1.5	mm	1. Tube material (user defined) 2. Tube length (If an AFT option is assembled, the length is required) 3. Tube diameter 4. Tube wall thickness
Name	Value	Unit															
1 Tube material	1	-															
2 Tube length	1000	mm															
3 Tube diameter	38	mm															
4 Tube wall thickness	1.5	mm															
2.	Current tools	Identification number of tool in the machine															
3.	Tube offset	The position of the collar can be adjusted according to zero point of the spindle, if the collar is not on the correct position on the tube															
4.	Trimming	Finishing time: The time the trimming blade uses to finalize the trimmed collar by rotating without feed.															
5.	Clamping	Tap to choose the automatic clamping ON or OFF															
6.	Other settings: Demo mode	Tap to choose the Demo mode ON or OFF: Mainly for testing the program without tube, runs the program without lubrication.															
7.	Other settings: Pause mode	Tap to choose the Pause Mode ON or OFF: Mainly for testing purposes, the "Pause Mode" runs the process in sections. Useful for example when testing a new tool.															

### 6.2.2.3.2. PROCESS SETTINGS

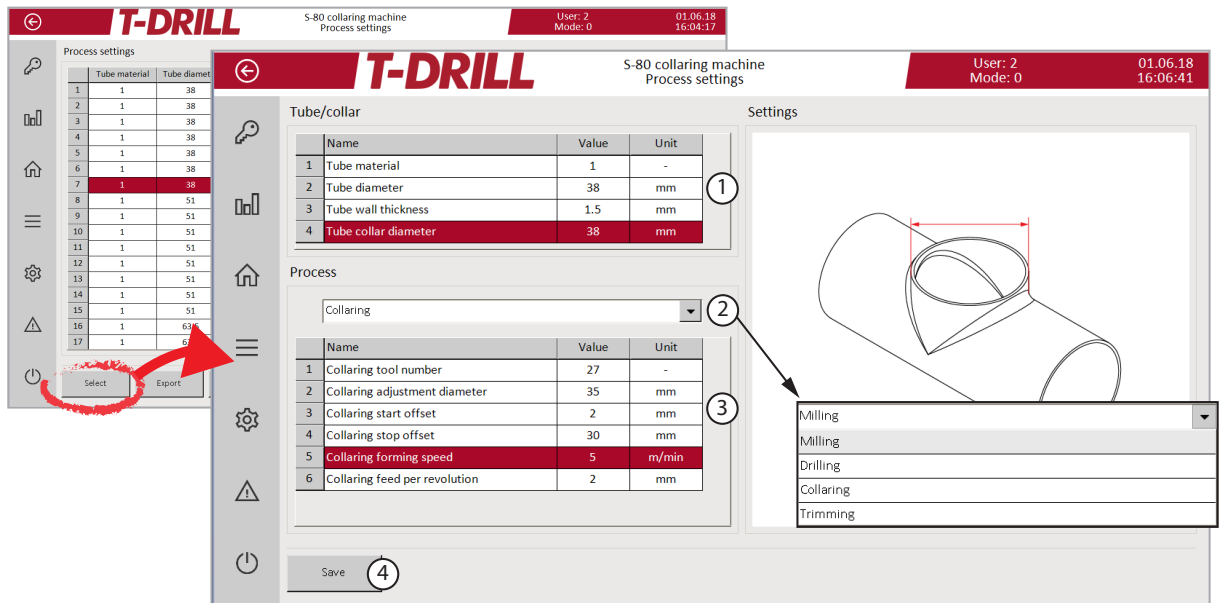
A process in the S-80 machine is one of the work phases; milling, collaring, trimming or drilling. The process settings screen is for definition of all values of selected process. The process settings screen is also for definition of the tool type.



1.	Predefined processes	<p><b>One process line has one tube and collar combination.</b></p> <p>The tools to perform this process is defined on the next screen. Select the process to manage from the list (activate line and it will turn red).</p> <p>The number fields on the picture are editable, the edited value is transferred to the chosen process list. The values can be edited also on the selected process screen.</p>
2.	Select	Tap to select the activated process, to open a new adjustment screen (see next picture).
3.	Export	The button exports the information data to the predefined folder on the computer C-drive (C:\T-Drill\).
4.	Import	The button imports the information data from the predefined folder on the computer C-drive (C:\T-Drill\).
5.	Copy	A faster way of making a new line to the list:
6.	Paste	Copy an activated line, and paste it below an activated line. Alter definitions as required.



## Process adjustment screen

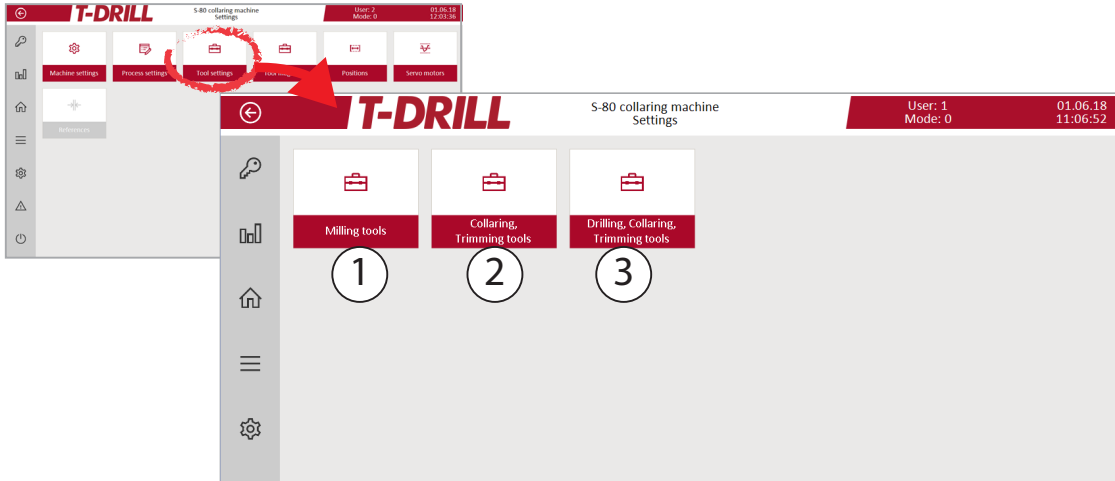


1.	Tube / collar	Basic information on tube to be collared
2.	Process: Pull down menu	Select the desired process from the pull down menu
3.	Adjustable definitions of the selected process	Check and alter definitions if required
4.	<b>NOTE! Save after changes are done!</b>	

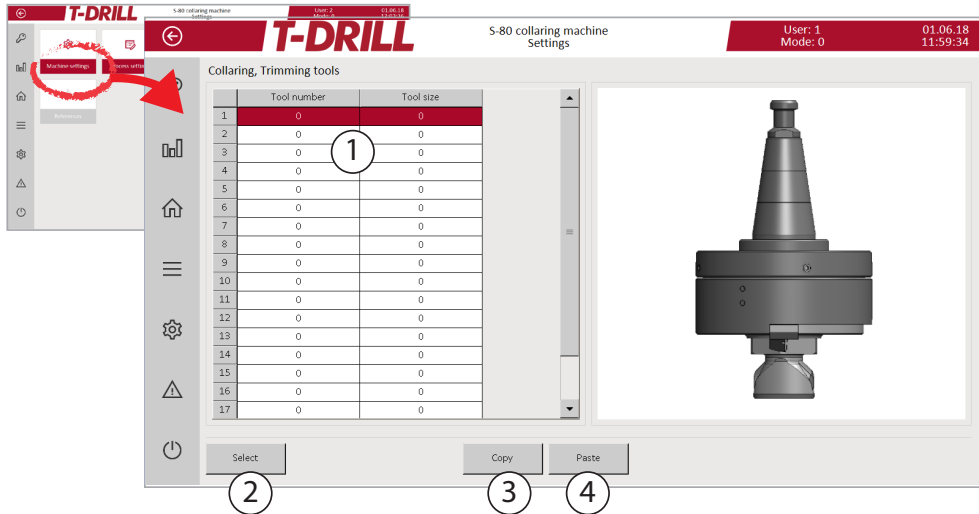
<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1 Milling tool number</td> <td>2</td> <td>-</td> </tr> <tr> <td>2 Milling diameter A</td> <td>28</td> <td>mm</td> </tr> <tr> <td>3 Milling diameter B</td> <td>17</td> <td>mm</td> </tr> <tr> <td>4 Milling cutting speed</td> <td>50</td> <td>m/min</td> </tr> <tr> <td>5 Milling feed per tooth</td> <td>0.1</td> <td>mm</td> </tr> </tbody> </table>	Name	Value	Unit	1 Milling tool number	2	-	2 Milling diameter A	28	mm	3 Milling diameter B	17	mm	4 Milling cutting speed	50	m/min	5 Milling feed per tooth	0.1	mm	<p>Milling process settings has all required information to make a pilot hole. For pilot hole measures, see pilot hole table. Check the milling instructions for tool size, always use a correct size milling pin.</p>			
Name	Value	Unit																				
1 Milling tool number	2	-																				
2 Milling diameter A	28	mm																				
3 Milling diameter B	17	mm																				
4 Milling cutting speed	50	m/min																				
5 Milling feed per tooth	0.1	mm																				
<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1 Drilling tool number</td> <td>0</td> <td>-</td> </tr> <tr> <td>2 Drilling start offset</td> <td>0</td> <td>mm</td> </tr> <tr> <td>3 Drilling stop offset</td> <td>0</td> <td>mm</td> </tr> <tr> <td>4 Drilling cutting speed</td> <td>0</td> <td>m/min</td> </tr> <tr> <td>5 Drilling feed per tooth</td> <td>0</td> <td>mm</td> </tr> </tbody> </table>	Name	Value	Unit	1 Drilling tool number	0	-	2 Drilling start offset	0	mm	3 Drilling stop offset	0	mm	4 Drilling cutting speed	0	m/min	5 Drilling feed per tooth	0	mm	<p>Drilling process settings has all required information to make a round pilot hole by drilling.</p>			
Name	Value	Unit																				
1 Drilling tool number	0	-																				
2 Drilling start offset	0	mm																				
3 Drilling stop offset	0	mm																				
4 Drilling cutting speed	0	m/min																				
5 Drilling feed per tooth	0	mm																				
<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1 Collaring tool number</td> <td>27</td> <td>-</td> </tr> <tr> <td>2 Collaring adjustment diameter</td> <td>35</td> <td>mm</td> </tr> <tr> <td>3 Collaring start offset</td> <td>2</td> <td>mm</td> </tr> <tr> <td>4 Collaring stop offset</td> <td>30</td> <td>mm</td> </tr> <tr> <td>5 Collaring forming speed</td> <td>5</td> <td>m/min</td> </tr> <tr> <td>6 Collaring feed per revolution</td> <td>2</td> <td>mm</td> </tr> </tbody> </table>	Name	Value	Unit	1 Collaring tool number	27	-	2 Collaring adjustment diameter	35	mm	3 Collaring start offset	2	mm	4 Collaring stop offset	30	mm	5 Collaring forming speed	5	m/min	6 Collaring feed per revolution	2	mm	<p>Collaring process settings has all required information to make a collar. Check tool adjustment.</p>
Name	Value	Unit																				
1 Collaring tool number	27	-																				
2 Collaring adjustment diameter	35	mm																				
3 Collaring start offset	2	mm																				
4 Collaring stop offset	30	mm																				
5 Collaring forming speed	5	m/min																				
6 Collaring feed per revolution	2	mm																				
<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1 Trimming tool number</td> <td>27</td> <td>-</td> </tr> <tr> <td>2 Trimming start offset</td> <td>4</td> <td>mm</td> </tr> <tr> <td>3 Trimming cutting speed</td> <td>50</td> <td>m/min</td> </tr> <tr> <td>4 Trimming feed per tooth</td> <td>0.1</td> <td>mm</td> </tr> </tbody> </table>	Name	Value	Unit	1 Trimming tool number	27	-	2 Trimming start offset	4	mm	3 Trimming cutting speed	50	m/min	4 Trimming feed per tooth	0.1	mm	<p>Trimming process settings has all required information to trim the collar to desired height.</p>						
Name	Value	Unit																				
1 Trimming tool number	27	-																				
2 Trimming start offset	4	mm																				
3 Trimming cutting speed	50	m/min																				
4 Trimming feed per tooth	0.1	mm																				

## 6.2.2.3.3. TOOL SETTINGS

Settings for all tools.

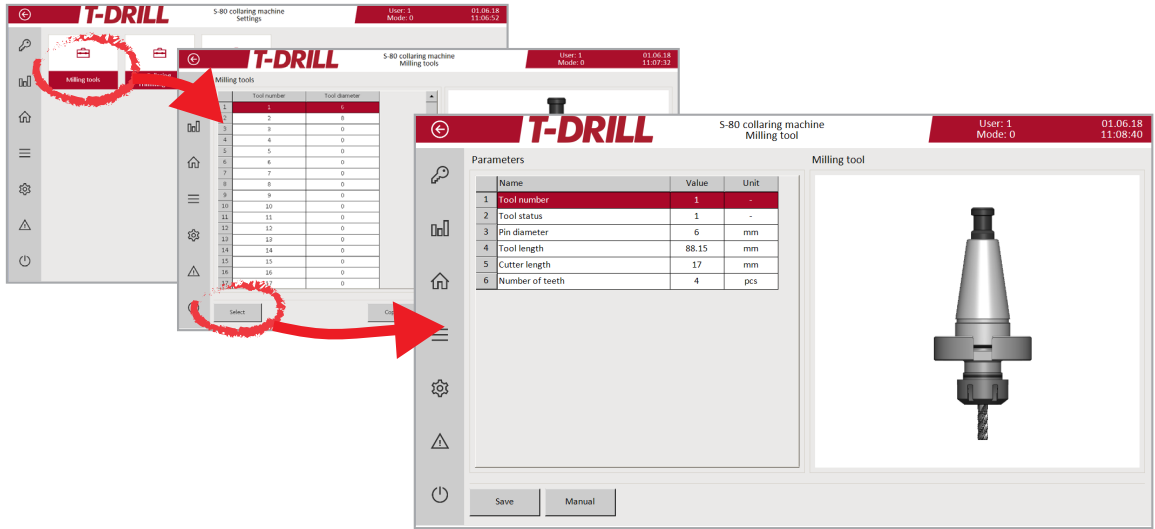


- |    |   |
|----|---|
| 1. | Tap to open Milling tool settings screen                                      |
| 2. | Tap to open Collaring and trimming S-80 combination tool settings screen      |
| 3. | Tap to open Drilling, collaring and trimming combination tool settings screen |

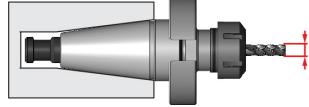
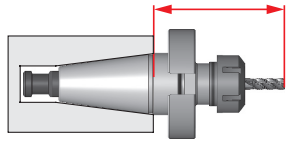
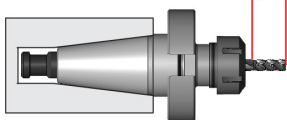
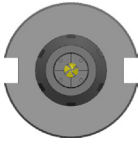


- |    |                          |   |
|----|--------------------------|---|
| 1. | Tool identification list | Select the tool to manage from the list (activate line and it will turn red).       |
| 2. | Select- button           | Tap to select the activated tool, opens a new adjustment screen (see next picture). |
| 3. | Copy                     | A faster way of making a new line to the list:                                      |
| 4. | Paste                    | Copy an activated line, and paste it below an activated line.                       |

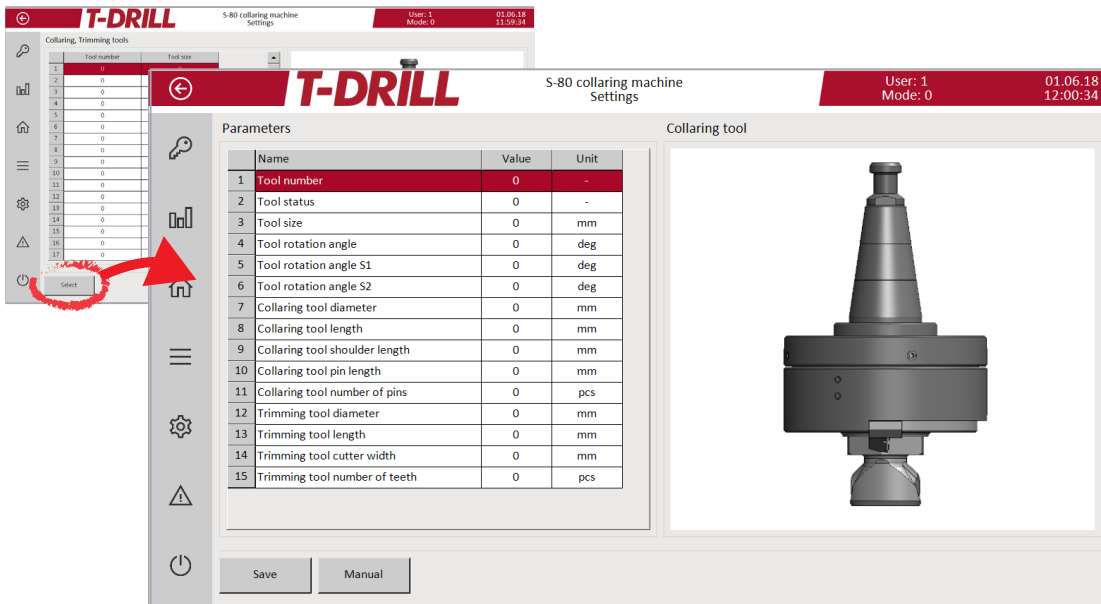
## 6.2.2.3.3.1. MILLING TOOLS



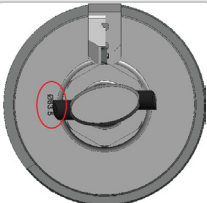
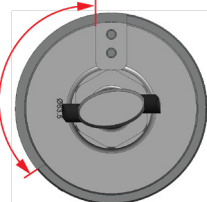
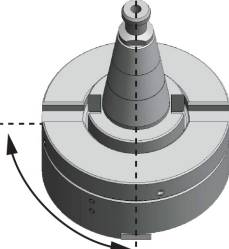
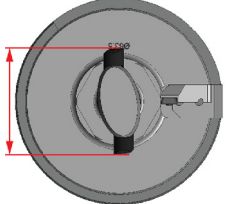
Name	Value	Unit
1 Tool number	1	-
2 Tool status	1	-
3 Pin diameter	6	mm
4 Tool length	88.15	mm
5 Cutter length	17	mm
6 Number of teeth	4	pcs

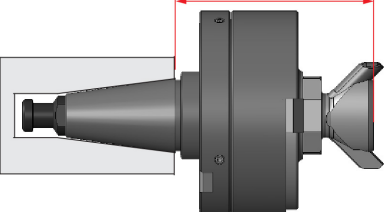
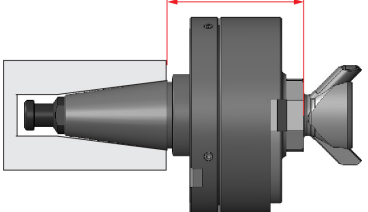
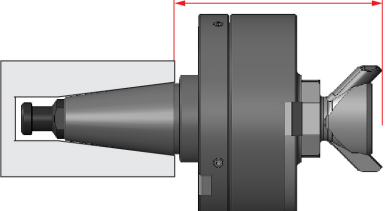
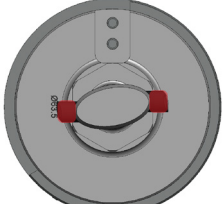
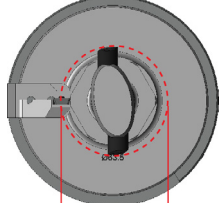
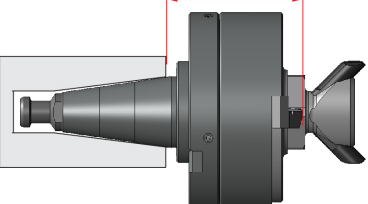
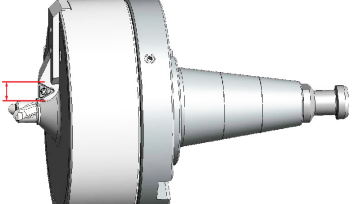
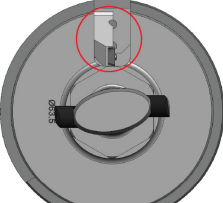
1	Tool number	Identification number of the tool	
2	Tool Status	N/A	
3	Pin diameter	The milling pin diameter, 6 or 8 mm are typically used	
4	Tool length	Length of the tool cone seam to end of milling pin	
5	Cutter length	Length of the cutting area of the milling pin	
6	Number of teeth	Number of flutes / cutting teeth in the milling pin	

## 6.2.2.3.3.2. COLLARING AND TRIMMING COMBINATION TOOLS (CT)

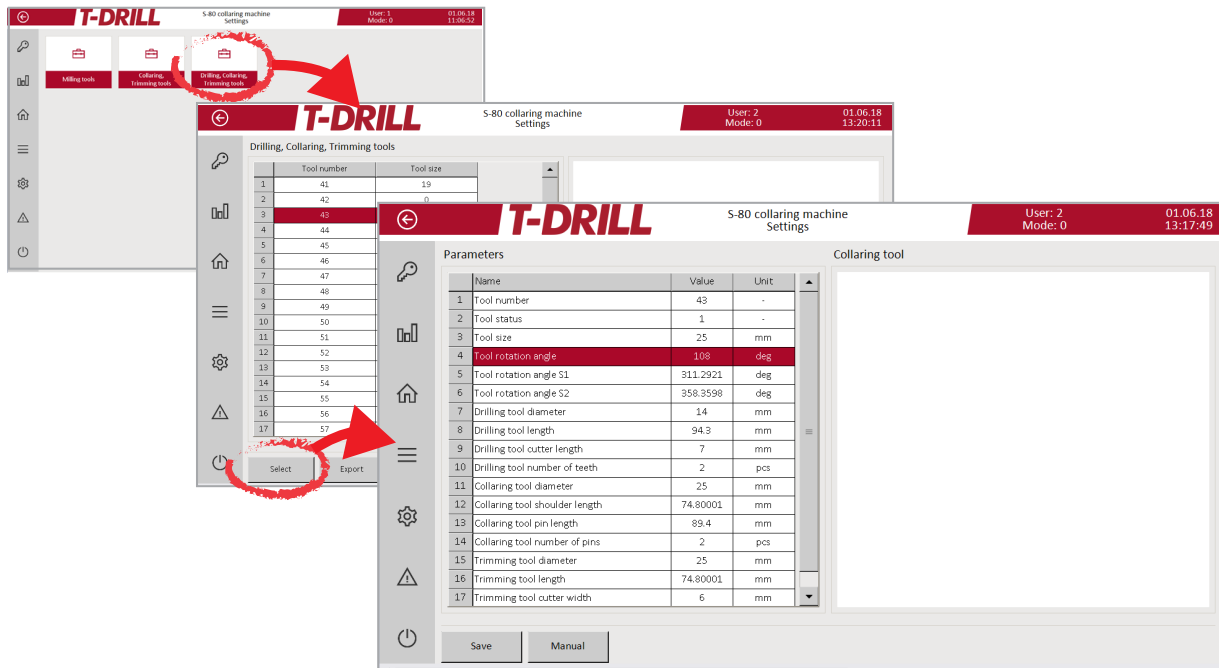


Tap "Save" after changing the settings.

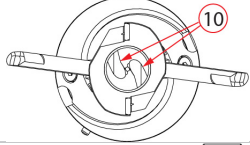
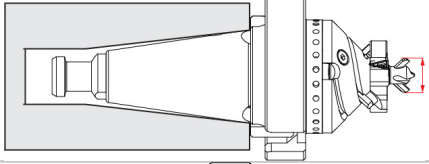
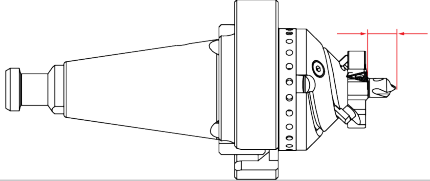
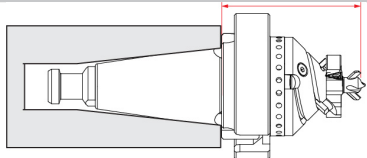
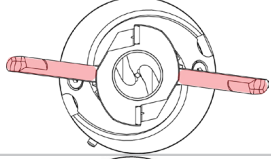
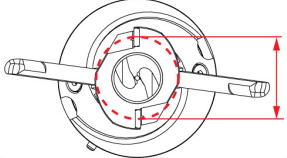
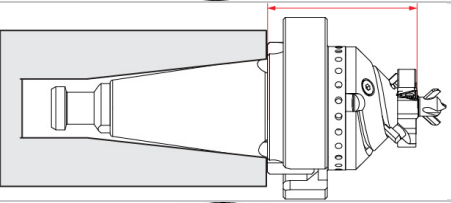
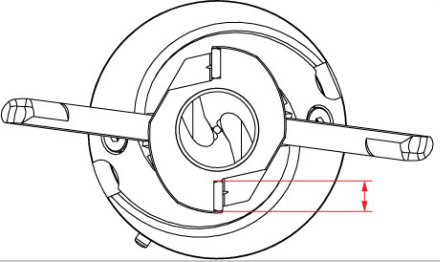
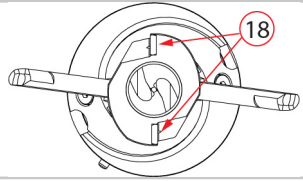
1	Tool number	Identification number of the tool	
2	Tool status	N/A	
3	Tool size	Nominal tool size, stamped on the tool	
4	Tool rotation angle		
5	Tool rotation angle S1		
6	Tool rotation angle S2		
7	Collaring tool diameter	Pin maximum diameter, with pins fully out. Measure!	

8	Collaring tool length		
9	Collaring tool shoulder length		
10	Collaring tool pin length		
11	Collaring tool number of pins		
12	Trimming tool diameter	The midst diameter of the cutter blade path (see picture)	
13	Trimming tool length		
14	Trimming tool cutter width	The width of the cutting insert	
15	Trimming tool number of teeth	The machine can be equipped with more that one cutter if necessary.	

## 6.2.2.3.3. DRILLING, COLLARING AND TRIMMING COMBINATION TOOLS (DCT)



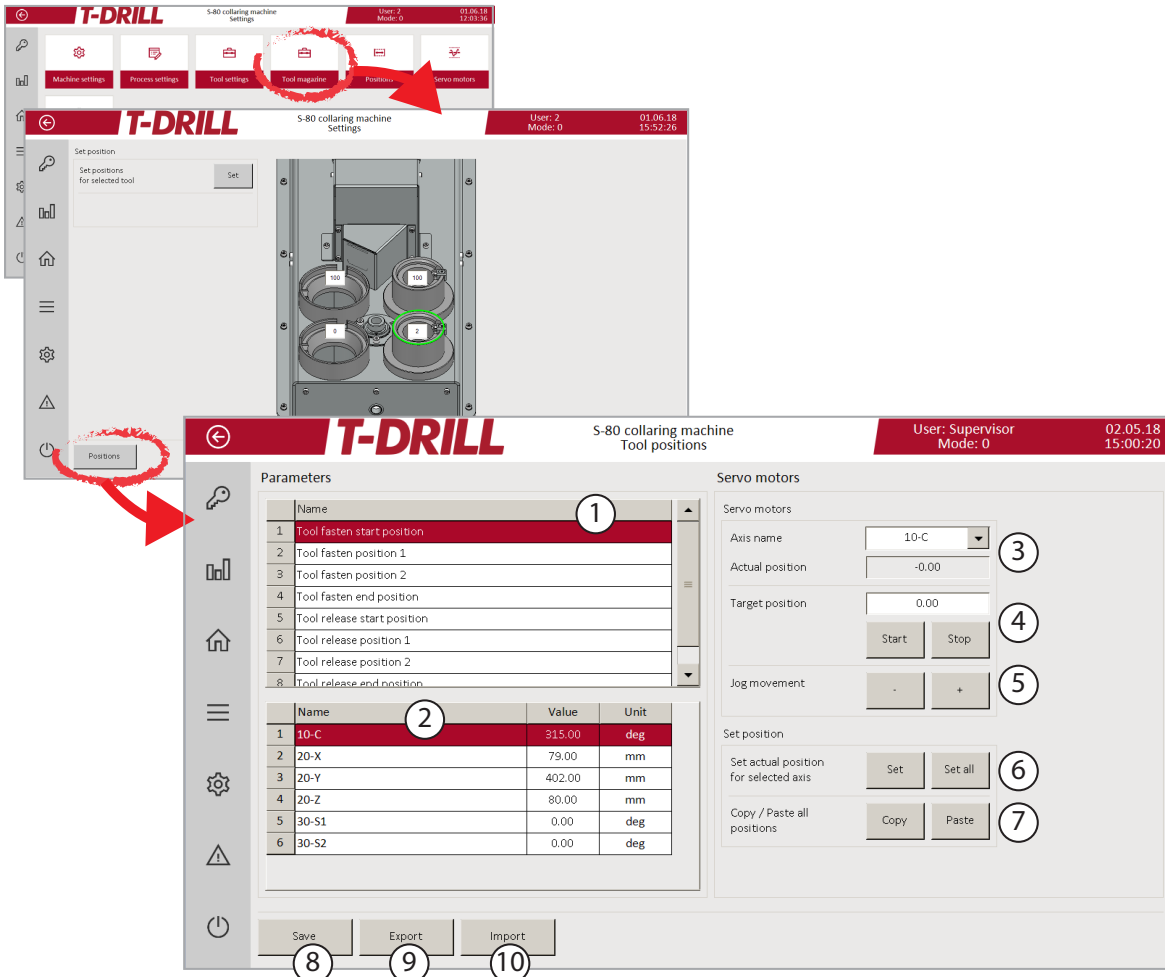
1	Tool number	Identification number of the tool	
2	Tool Status	N/A	
3	Tool size	Nominal tool size, stamped on the tool	
4	Tool rotation angle		
5	Tool rotation angle S1		
6	Tool rotation angle S2		
7	Drilling tool diameter		
8	Drilling tool length	Length of tool from cone bottom to the drill end	
9	Drilling tool cutter length	Length from the cutter insert to the drill end.	

10	Drilling tool number of teeth	Number of cutting edges on the drill.	
11	Collaring tool diameter	Diameter with pins fully out. Measure!	
12	Collaring tool shoulder length	Length of tool from bottom to shoulder surface of the tool = the length of the tool that will go inside the tube.	
13	Collaring tool pin length	Length of tool from cone bottom to pin ends with pins fully out	
14	Collaring tool number of pins	A counting parameter for the program.	
15	Trimming tool diameter	The midst diameter of the cutter insert path (see picture)	
16	Trimming tool length	Length of tool from cone bottom to trimming cutting insert / tooth.	
17	Trimming tool cutter width	Width of the cutting insert / cutter blade of the tool.	
18	Trimming tool number of teeth	The trimming tool can be equipped with more than 1 tooth / cutting insert. Counting parameter.	

**Tap "Save" after changing the settings.**

## 6.2.2.3.4. TOOL MAGAZINE

Activate tool holder to manage parameters, tap select to open parameter screen:

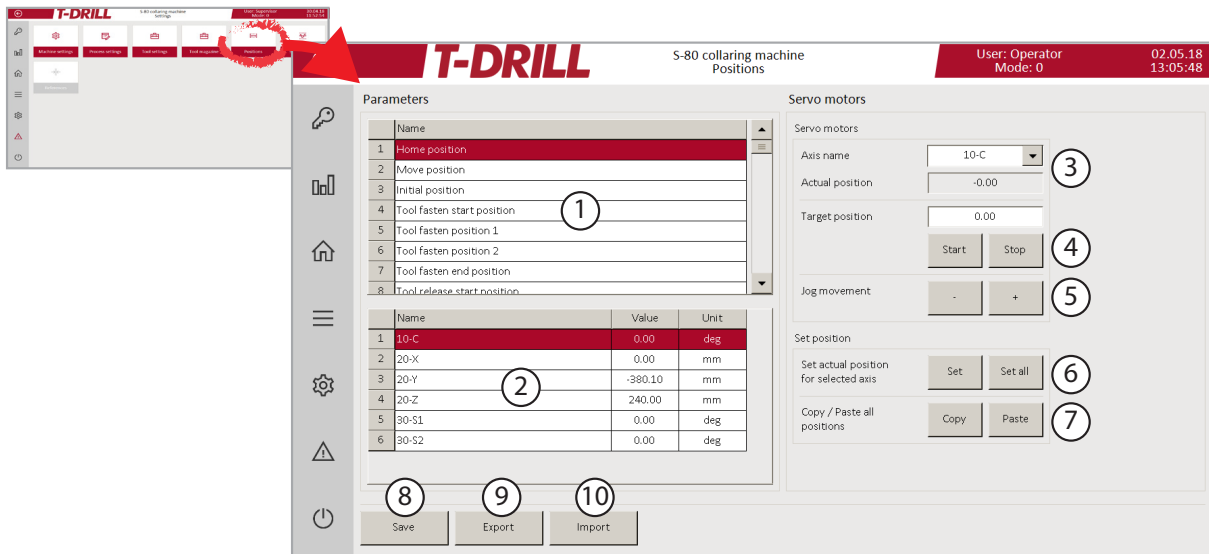


1.	Positions list	List of positions of the chosen magazine tool holder.
2.	Axes and parameter values	Values to adjust, tap numeric field to open keypad.
3.	Servo motor axis list	Choose axis to move / check position from the pull down menu.
4.	Moving to a certain position	“Actual position” field shows the current position, and the desired target position is written to the “Target position” field. Tap the target field to open keypad. Start button moves the axis to target position, tap Stop button in case necessary to stop before target.
5.	Jog movement	(+) and (-) buttons move the axis in steps (jog).



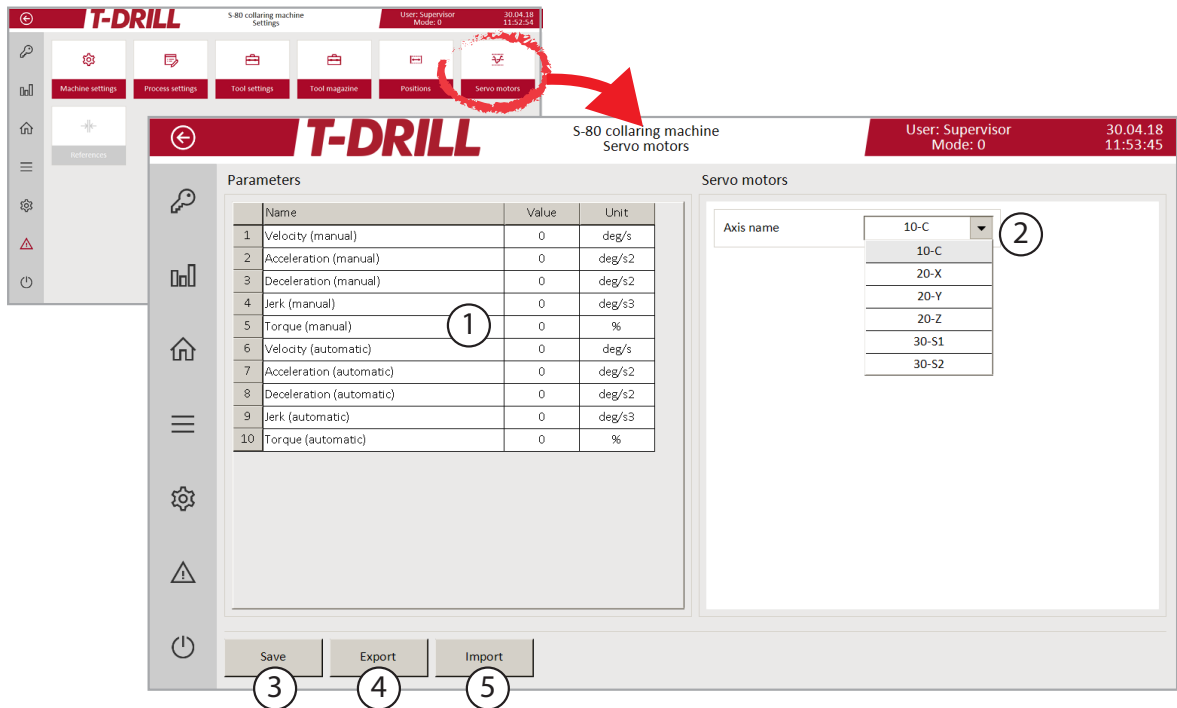
6.	Set actual position for selected axis	For setting of the actual position one selected, or all axis, after a successful positioning. “Set” sets only the one activated axis position line on field 2, “Set all” sets all field 2 positions at once.
7.	Copy / paste all positions	Activate a line from field 1, tap “Copy” to copy all field 2 information. Activate another line from field one and tap “Paste” to paste all information to field 2 of the activated line.
8.	Save	<b>Tap “Save” after changing the settings.</b>
9.	Export	The button exports the information data to the predefined folder on the computer C-drive (C:\T-Drill\).
10.	Import	The button imports the information data from the predefined folder on the computer C-drive (C:\T-Drill\).

## 6.2.2.3.5. POSITIONS



1.	Positions	List of manageable positions (Scroll up/down)
2.	Axes and parameter values	Values to adjust, tap numeric field to open keypad.
3.	Servo motor axis list	Choose axis to move / check position from the pull down menu.
4.	Moving to a certain position	“Actual position” field shows the current position, and the desired target position is written to the “Target position” field. Tap the target field to open keypad. Start button moves the axis to target position, tap Stop button in case necessary to stop before target.
5.	Jog movement	(+) and (-) buttons move the axis in steps (jog).
6.	Set actual position for selected axis	For setting of the actual position one selected, or all axis, after a successful positioning. “Set” sets only the one activated axis position line on field 2, “Set all” sets all field 2 positions at once.
7.	Copy / paste all positions	Activate a line from field 1, tap “Copy” to copy all field 2 information. Activate another line from field one and tap “Paste” to paste all information to field 2 of the activated line.
8.	Save	<b>Tap “Save” after changing the settings.</b>
9.	Export	The button exports the information data to the predefined folder on the computer C-drive (C:\T-Drill\).
10.	Import	The button imports the information data from the predefined folder on the computer C-drive (C:\T-Drill\).

## 6.2.2.3.6. SERVO MOTORS

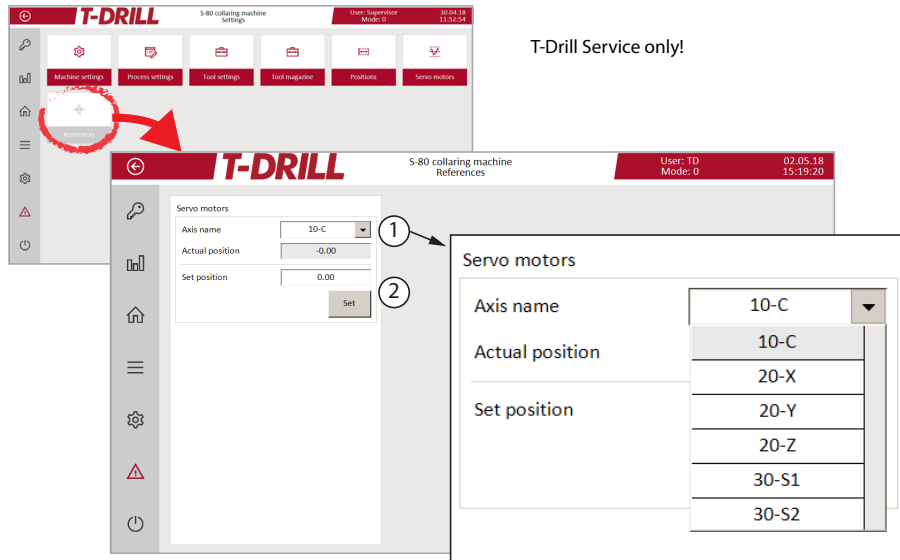


Adjustment parameters for the servo motors: The selected servo motor frame will turn green on the screen (the motor can also be selected from the screen by tapping the colored frame around it).

1.	Manageable parameter values	Values to adjust, tap numeric field to open keypad.
2.	Servo motor axis list	Choose axis to move / check position from the pull down menu.
3.	Save	<b>Tap “Save” after changing the settings.</b>
4.	Export	The button exports the information data to the predefined folder on the computer C-drive (C:\T-Drill\).
5.	Import	The button imports the information data from the predefined folder on the computer C-drive (C:\T-Drill\).

## 6.2.2.3.7. REFERENCES

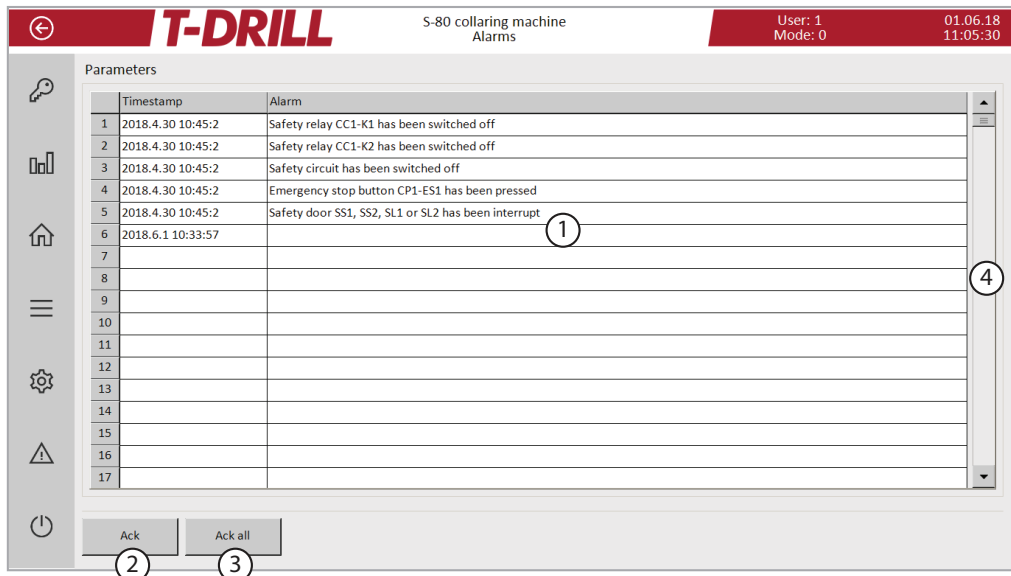
**T-Drill service only. Required only when mechanical parts are changed.**



Choose axis to move / check position from the pull down menu.

**About tools: 6.5.5. Reference position setting tools**

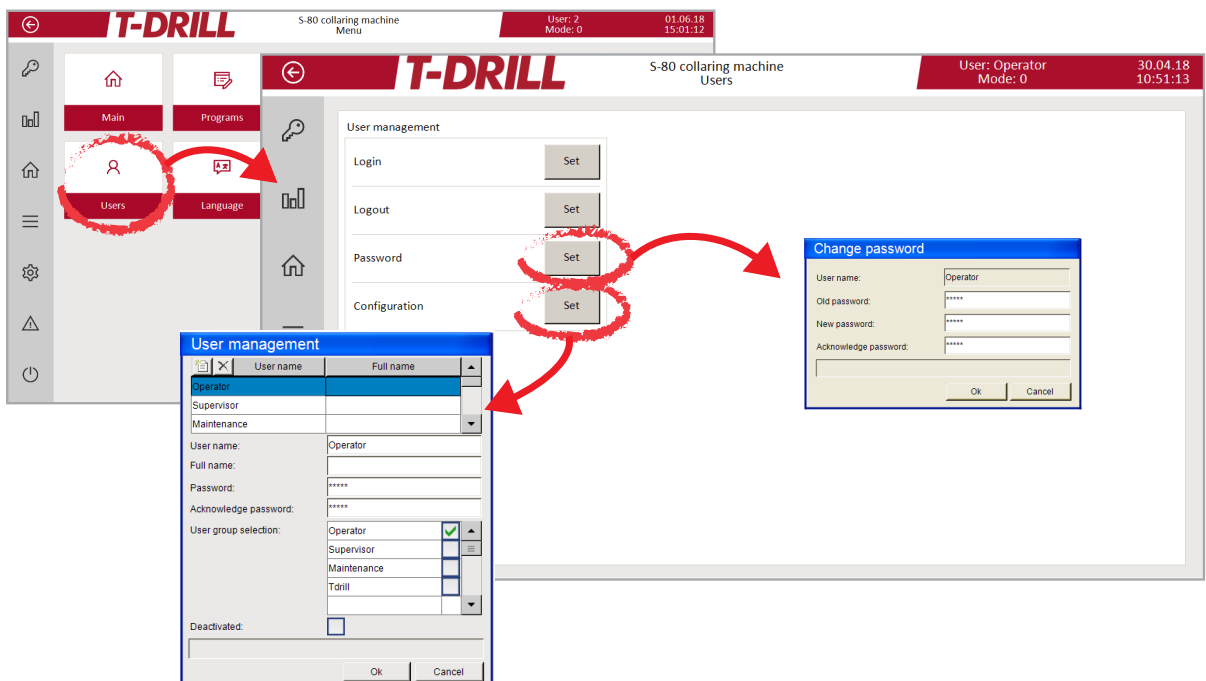
## 6.2.2.4. ALARMS SCREEN



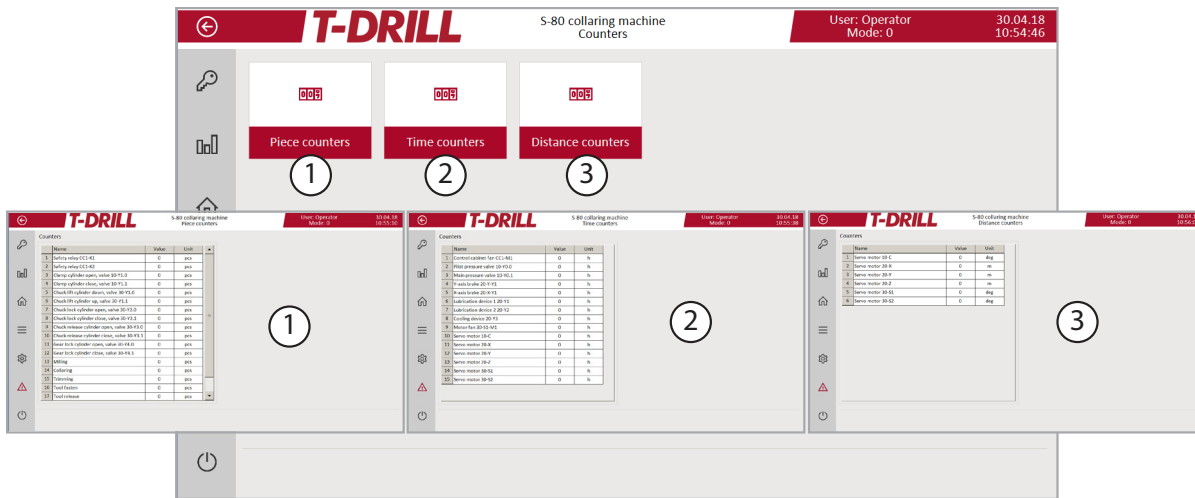
1.		Alarm information area
2.		Acknowledge only selected alarm line
3.		Acknowledge all alarm lines (Non-active alarms).
4.		Scroll alarms

## 6.2.2.5. USERS MANAGEMENT

Tap desired function "Set" button to open pop-up setting screen. All users information can be edited here.

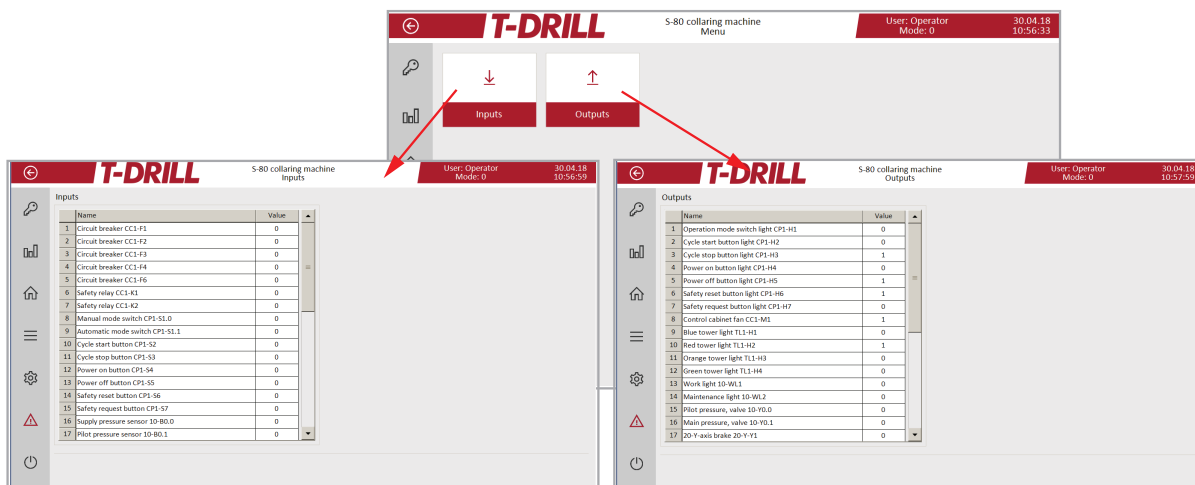


## 6.2.2.6. COUNTERS SCREEN



Check all counters to follow the machine events.

## 6.2.2.7. I/O DATA SCREEN



The I/O screens show the actual inputs and outputs. Helps with troubleshoot!

## 6.3. STOPPING THE MACHINE

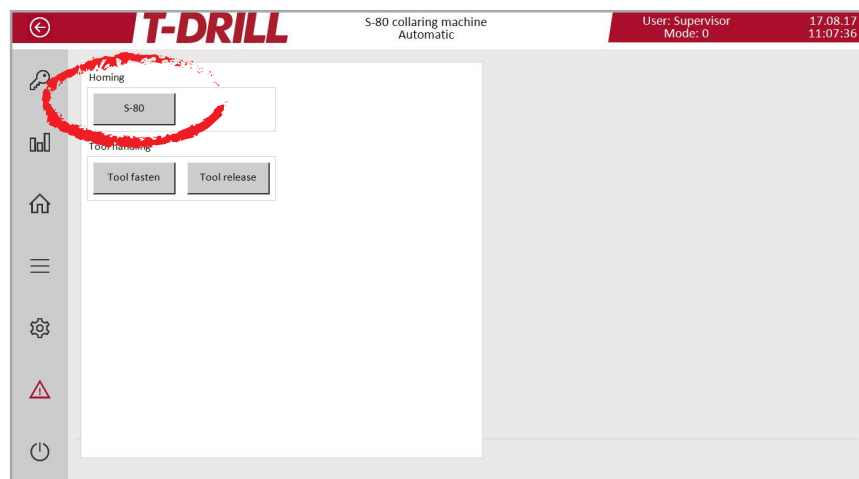
### 6.3.1. EMERGENCY STOPPING

In case of danger, stop the machines by pressing the EMERGENCY STOP push button completely down. This immediately interrupts all functions of the S-80 unit.



➔ **NOTE!** The safety curtain functions as emergency stop! When the safety curtain is interrupted, the machine will stop immediately.

When the light curtain has been interrupted during the work cycle, the HOMING of all movements has to be done in Manual screen:



After homing the last workpiece is removed, and a new workpiece can be placed to the clamps and a new work cycle can be started.

When the light curtain has been interrupted during the tool change or the EMERGENCY STOP push button has been pushed, all movements (axis and cylinders) have to be driven to correct positions on Manual screen.

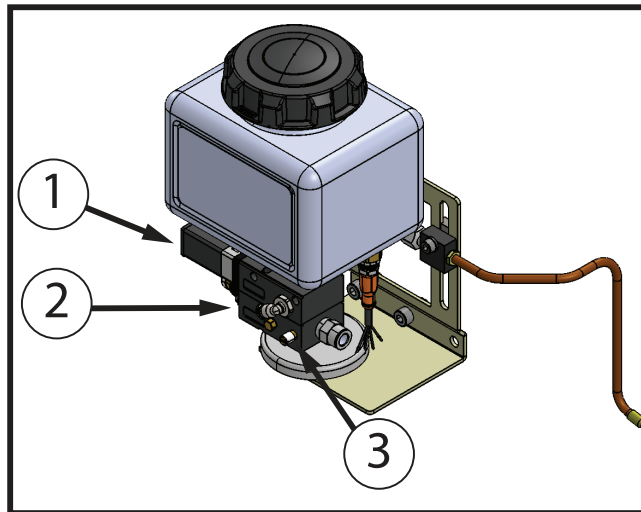
For a controlled interrupt of the safety curtain, see 6.1.3. Control panel instructions: Use the “Enter the safety area request button”.

### 6.3.2. NORMAL STOPPING OF THE S-80 UNIT

1. Wait until the unit has finished the automatic work cycle.
2. Disconnect the main power from the main power switch (O) on the electric cabinet.
3. Close the air supply main valve on the pressure regulator.

### 6.4. THE LUBRICATION OF THE COLLARING PROCESS

The use of a lubricant is recommended when collaring most materials. The mist lubrication system consists of the lubricator and a special-made nozzle pipe.



*The mist lubrication system: 1. Pulse / min, 2. Oil amount regulator, 3. Air flow control*

#### **The use of the mist lubrication system:**

1. Fill the oil container with lubricant (Use only lubricants recommended by T-Drill).
2. Point the lubrication nozzle so that the mist spray reaches the collaring area.

The quantity of lubricant is determined by means of the regulator. When tightening the regulator, the amount of oil increases and when opening it, the amount of oil decreases.

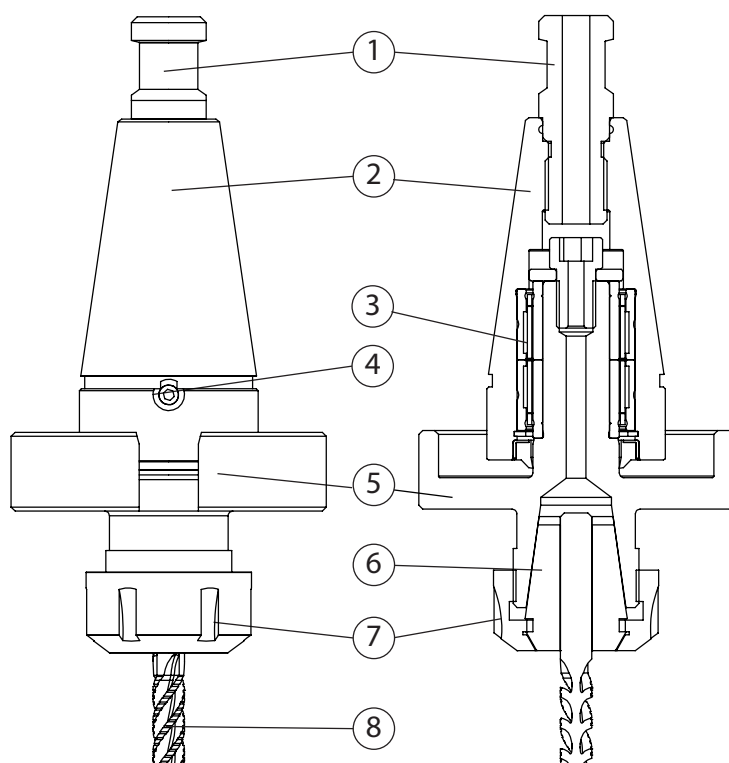
**➔NOTE! Make yourself familiar with the safety data sheet of the lubricant before handling it.**

**➔NOTE! Check periodically the oil container in the mist lubrication. Air pressure of the machine must be switched off when refilling oil container.**



## 6.5. TOOLS

### 6.5.1. MILLING TOOL



1. Retention knob
2. Tool holder cone
3. Bearing
4. Grease nipple
5. Collet chuck
6. Spring collet
7. Pin tightening nut  
(Tool in the tool kit)
8. Milling pin

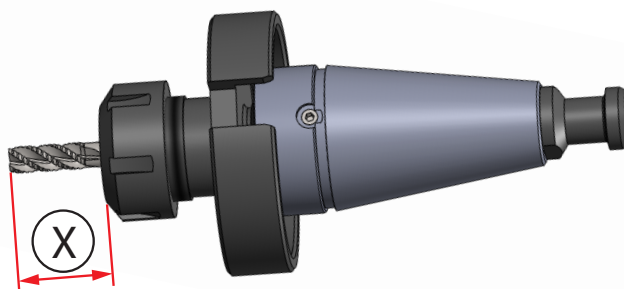
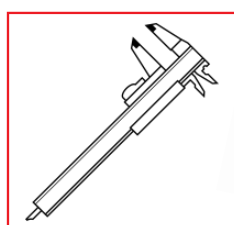
#### Changing of the milling pin:

Open the pin tightening nut (7) with the special tool, loosen the nut to release the pin from the spring collet (6).

Change pin, and tighten nut: Adjust the pin height, measure with a vernier caliper from the from the bottom of the collet:

Pin diameter 6 mm - length 22 mm from the bottom of the collet.

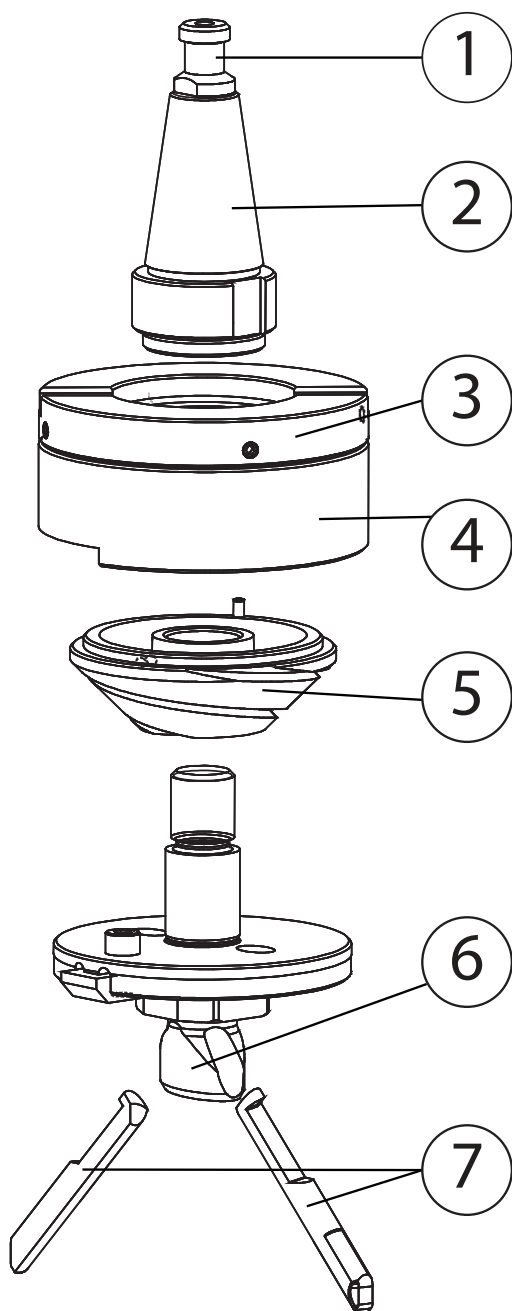
Pin diameter 8 mm - length 25 mm from the bottom of the collet.



*X : Pin length from the bottom of the collet.*

**➔NOTE! Tighten the nut securely.**

### 6.5.2. COLLARING / TRIMMING TOOL



1. Retention knob

2. Tool holder cone

3. Tool cover (adjuster disc)

4. Drive wheel

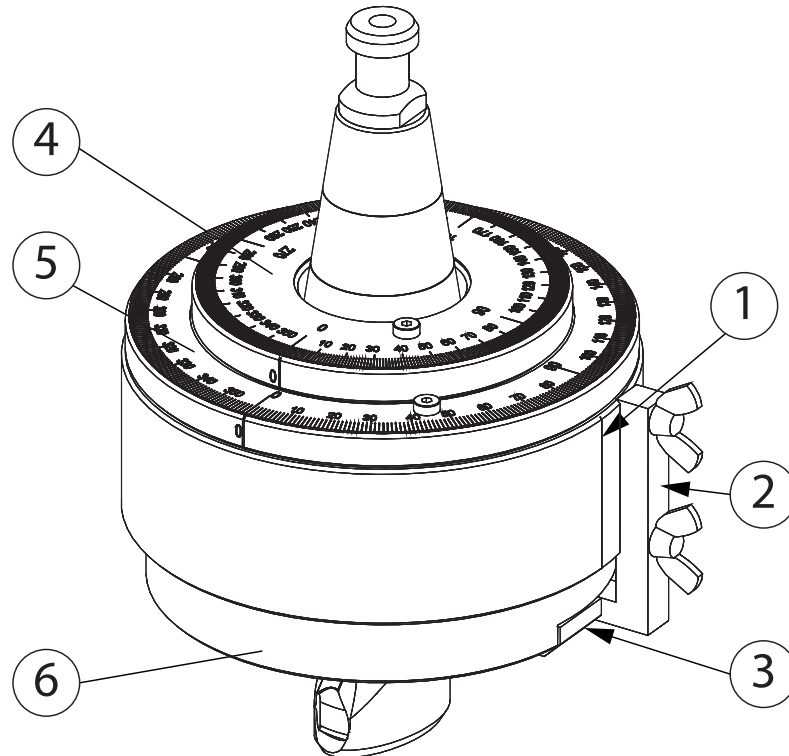
5. Cone

6. Drill core

7. Forming pins

## 6.5.2.1. COLLARING TOOL MEASURING DEVICE 5560252

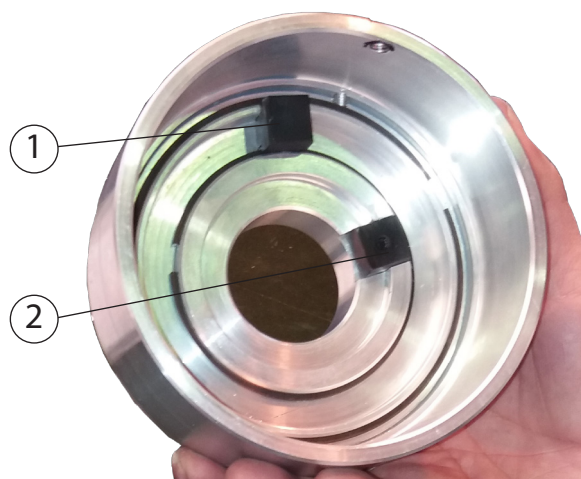
Tool angles are tool specific. The collaring tool angle difference changes when the tool is disassembled and assembled again. A new tool needs to be measured and angle information filled to the machine tool definition screen on control panel display.



1. Zero line, 2. Positioning peg, 3. Drive key (stopper), 4. Dial: Tool holder cone - drill core angle difference (S1 axis), 5. Dial: Drive wheel - drill core angle difference (S2 axis), 6. Collaring tool.

**The tool axis angles affect the positioning of the tool. The angles depend on how tightly the tool is tightened when assembled.**

The measuring device gives you a rough value of the angles, the precise values are received by positioning the tool on manual screen of the operators panel.



Measuring device from the inside: 1. Drive wheel axis piece, 2. Tool holder cone axis piece

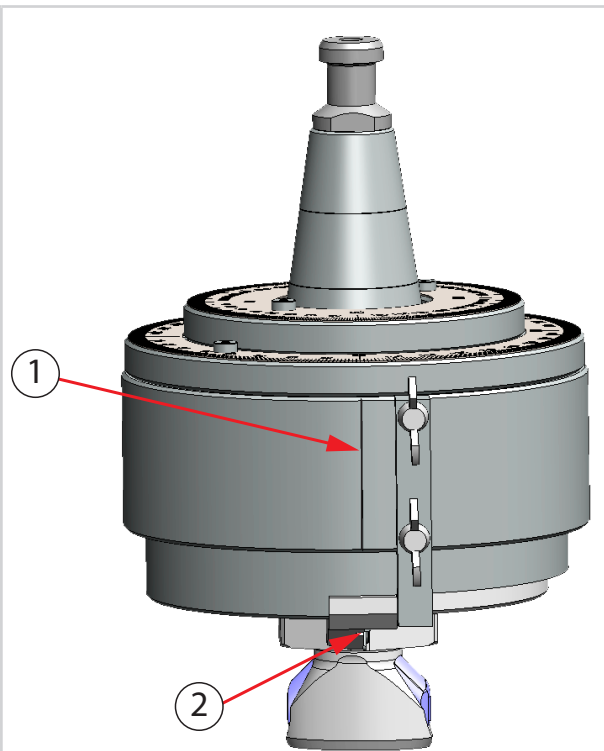
### How to use the measuring device:

Rotate the measuring device parts to set all 0-lines to the same side of the device.  
There are two (2) alignment pieces inside the device, that will fit the collaring tool axis key grooves.

Loosen the positioning peg by the wing bolts.

**Place the device on the collaring tool and make sure that the device alignment pieces go to the bottom of the grooves, and the device is positioned so, that the zero lines are on the operator side (drive key stopper).**

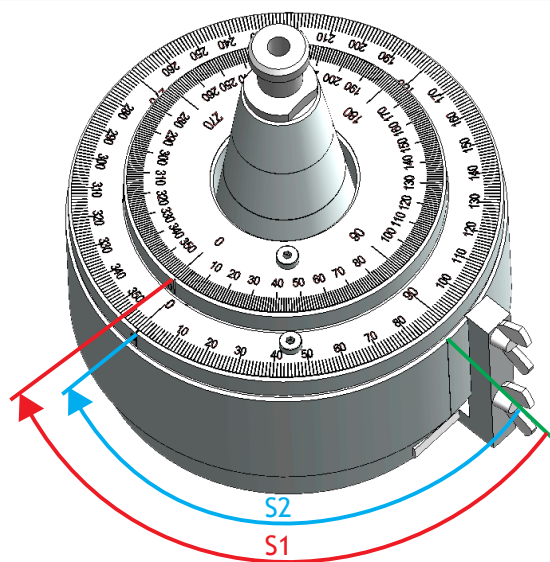
Rotate tool against the stopper, and tighten to place wit positioning peg (Tightened peg will prevent rotating). The zero line (1) of the device is placed so that it is in the middle of the drive key / trimming blade holder (2).



The angle difference can be now calculated from the dial values.  
Values are read clockwise.

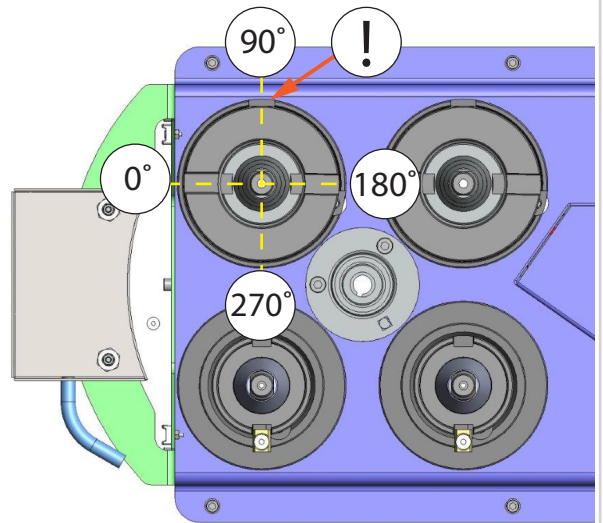
The outer dial shows the angle difference between the drive wheel and drill core (S2), inner dial shows the angle difference between the tool holder cone and drill core (S1).

Read the angle difference from the dials:  
S1 angle difference  $xx^\circ$   
S2 angle difference  $yy^\circ$



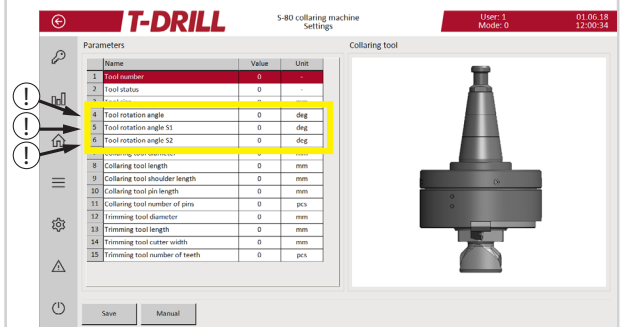
⚠ = The drive key / stopper position is 90° when the tool is placed in the magazine.

The pick up angles of the tool are  
 $S1 = 90^\circ + xx^\circ$   
 $S2 = 90^\circ + yy^\circ$



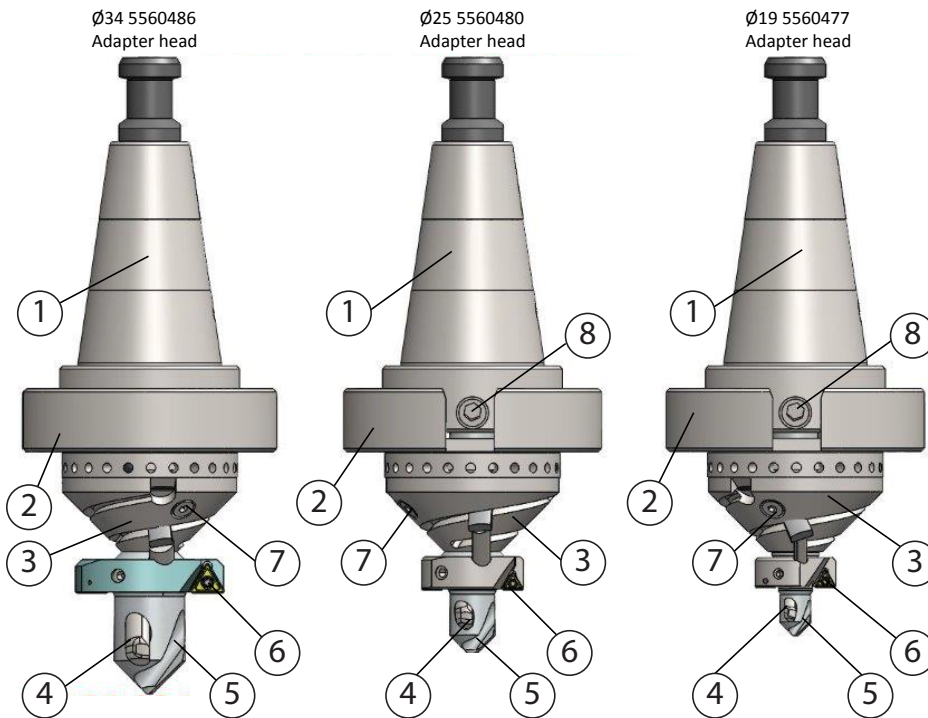
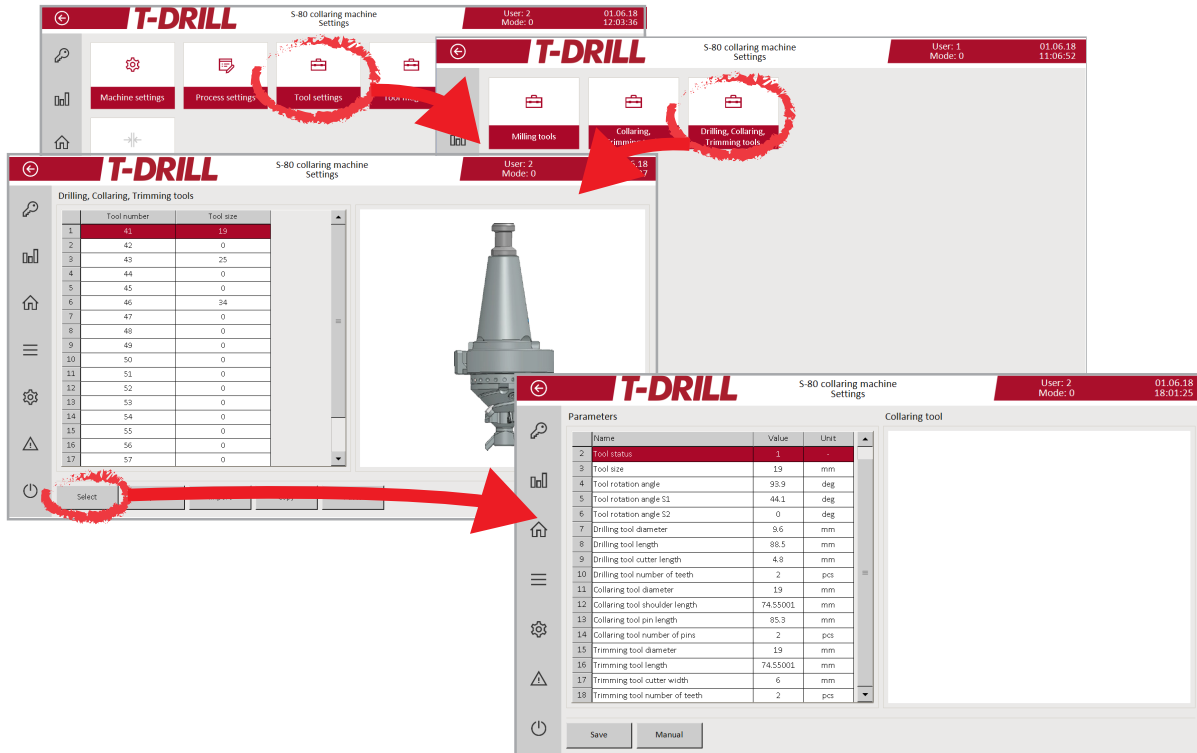
➔ **NOTE!** Only positive angle values are allowed. Angles are measured clockwise from the 0-point.

The values are written to the 6.2.2.3.3. Tool settings screen table:  
 Fill in the values to the tool information screen fields. (Tap numeric field to open pop-up keypad).



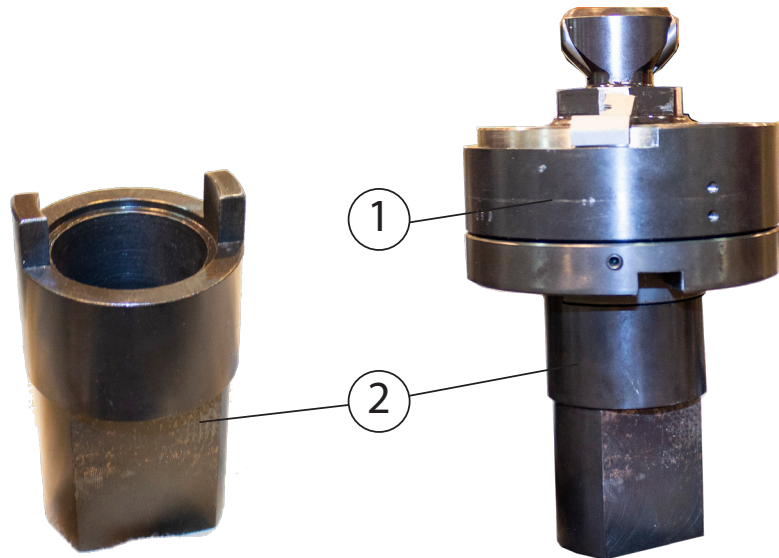
## 6.5.3. DRILLING COLLARING TOOLS

DCT tool has its own setting screen on Settings - Tool Settings:



Drilling collaring tool parts: 1. Cone (retention knob is fixed to the cone), 2. Brake drum, 3. Adjuster cone, 4. Forming pin, 5. Pilot hole drill, 7. Locking screw, 8. Cone locking set screw

## 6.5.4. TOOL CONE JIG 6560093



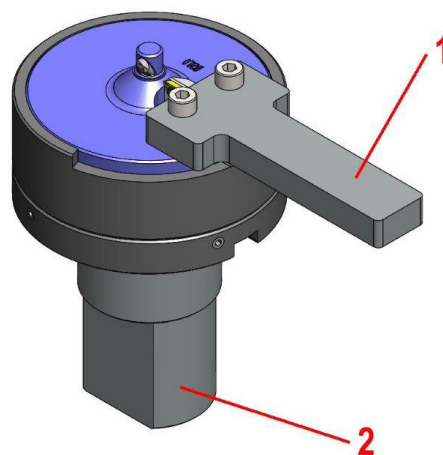
1. Collaring tool, 2. Jig

This tool cone jig is designed to ease dismantling and tightening of the tool cones. The jig is tightened to a vice bench, and the tool is placed to the jig, the jig lugs will keep the tool in position when loosening or tightening the cone to the tool.

Tool cone jig 6560093 is used with all collaring tools to avoid leaving marks and scratches to the tool cone.

## 6.5.5. FORK TOOL 6560094

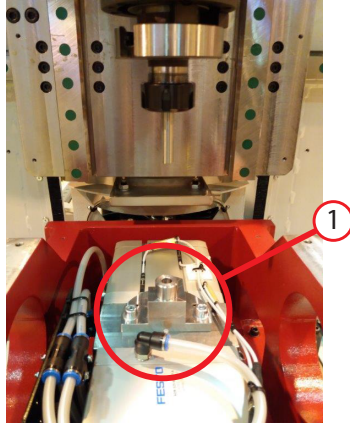
The special fork tool 6560094 is used to open and tighten smaller tools, that do not have a hex head for an ordinary spanner.



1. Fork special tool 6560094, 2. Tool cone jig 6560093

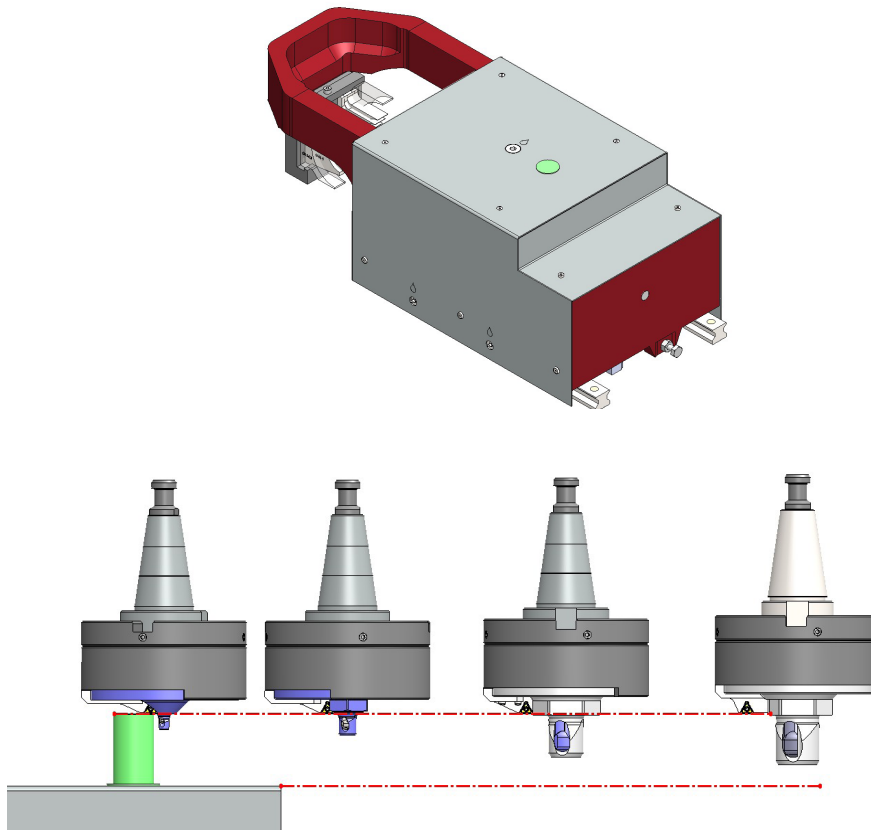
## 6.5.6. REFERENCE POSITION SETTING TOOLS

The spindle reference position setting tool is fixed to the machine main body, in the middle of the clamp frame. The reference points of the machine axis require setting only when the machine has had a major repair, like change of a servo motor, which will affect the position of the parts.



### 1. The fixed spindle reference position setting tool

The tool references are defined using a reference arbor, which is placed on the fixed reference tool through the hole in the clamp frame cover.

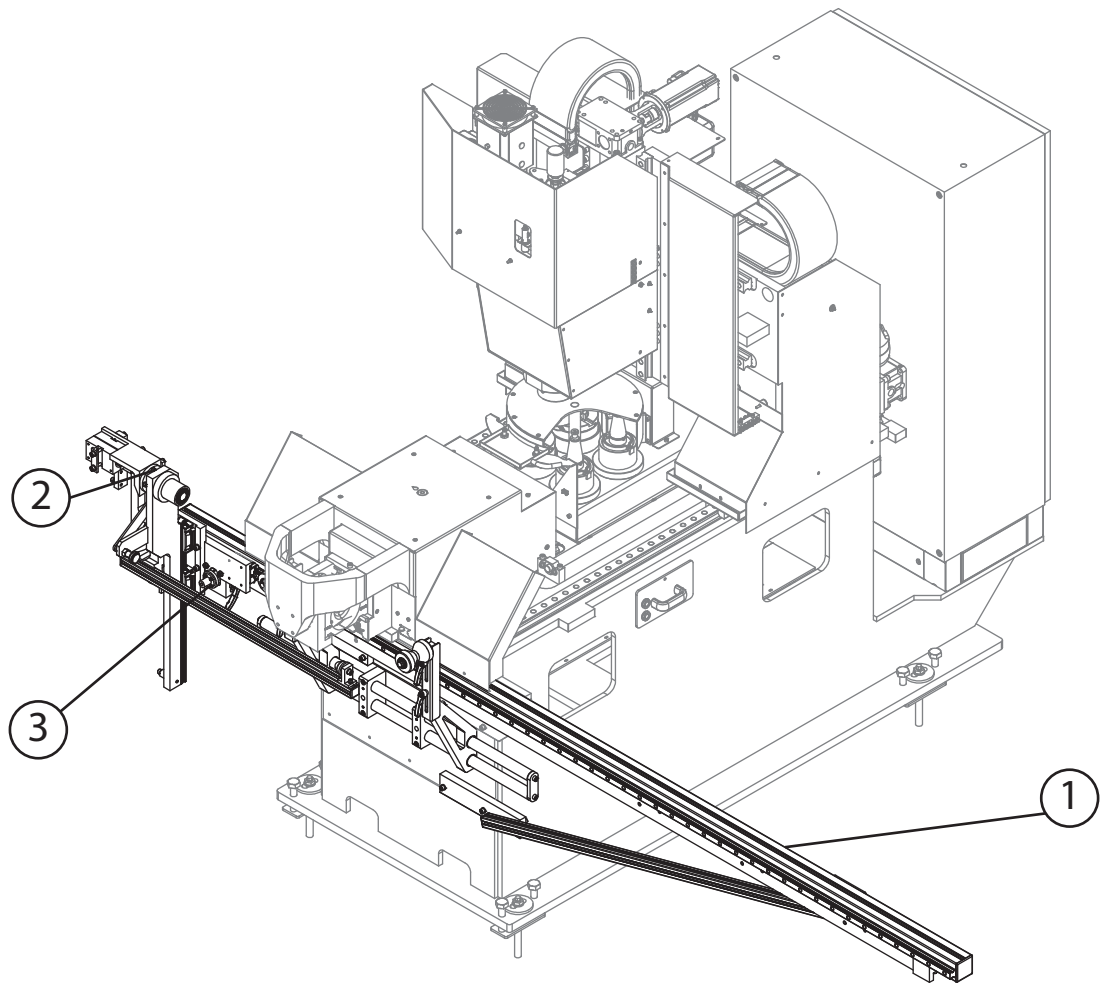


The tool is fastened to the chuck and moved to the arbor using manual mode and slower movements / torques.

The hole in the clamp frame cover is covered with a plastic cap when not in use.



## 6.6. MANUAL FEED TABLE

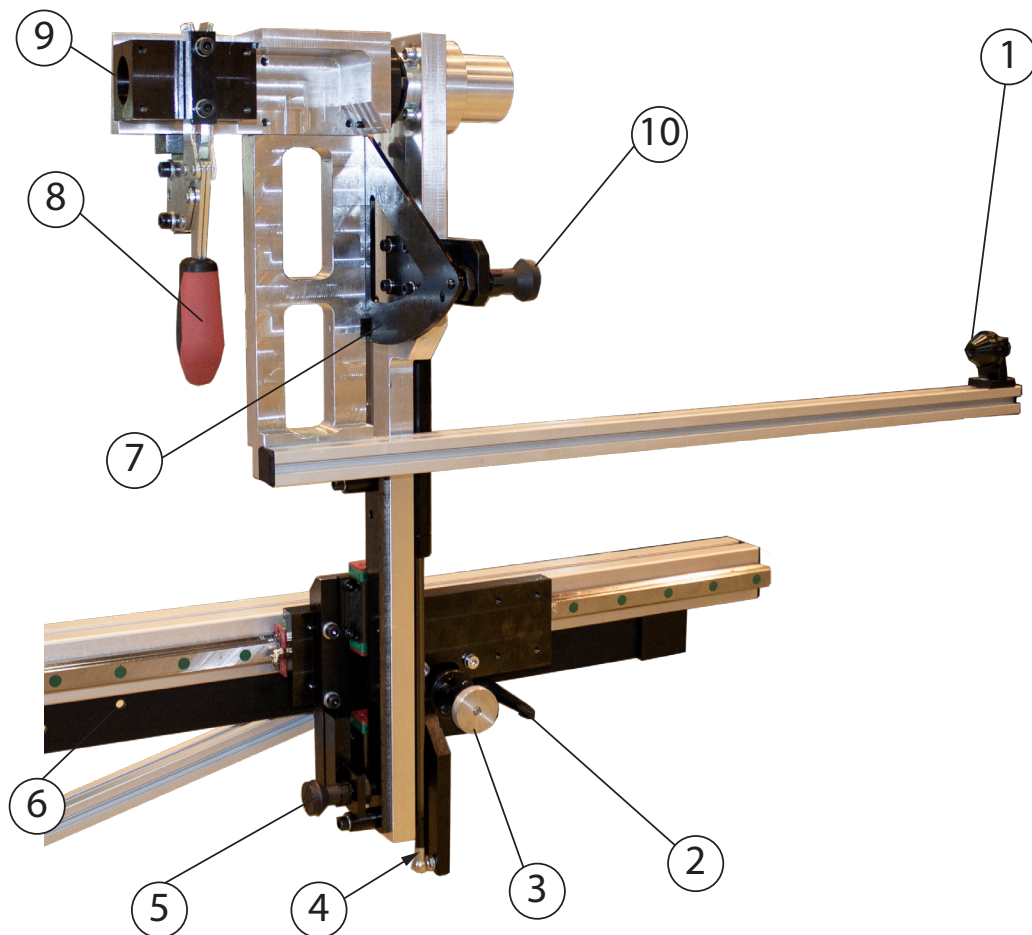


*Manual feed table parts: 1. Table frame, 2. Positioning device, 3. Positioner plate*

This manual positioning table is designed for one certain 38 mm diameter bent tube and two different sets of collars to it.

The manual positioning device is equipped with a two-stage positioning plate ("pin-to-hole) and an angle and height adjustment to allow the bent tube to go through the S-80 machine.

The tube is clamped to the Manual Feed Table (MFT) and the collars are made to correct positions using the horizontal positioning and angle positioner.



1. Tube holder, 2. Locking lever for positioner, 3. Positioner (pin to hole), 4. Gas spring, 5. Lift / lower locking knob, 6. Positioning plate (2 sets of holes), 7. Angle positioning plate, 8. Tube clamp operating lever, 9. Tube clamp, 10. Angle positioning knob.

### **To use the MFT:**

Open clamp (9) by the lever (8).

Place the tube to Tube holder (1) and to the clamp (9), close the clamp.

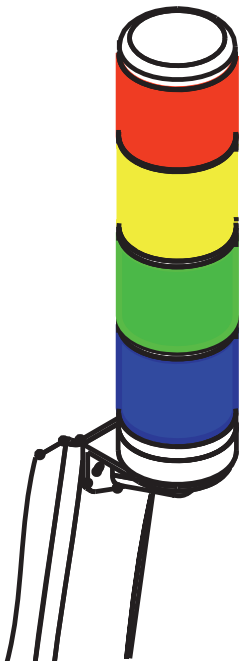
Adjust height for the collaring of the left end of the tube: Pull knob (5) and adjust height, the gas spring (4) will ease lifting.

Adjust correct positioning plate: open locking lever (2) and pull knob (3) to adjust height. Lock the positioner. To slide the positioner to next positioning point (hole), pull the knob (3) and push the device to point.

Adjust correct angle: Pull knob 10 and turn the angle plate to desired angle (positioning holes are for rotation of 0, 5 or 50 degrees).

## 6.7. CONTROL TOWER SIGNAL LIGHTS

The signal light shows the state of the machine.

	Red The machine has stopped because of a fault, e.g. servo fault or main air pressure is too low,, emergency stop. Red blinks if there is an active alarm!
	Orange Manual mode.
	Green The machine is operating, Automatic mode.
	Blue Door open.

### 7. OPERATION OF THE S-80 MACHINE

Ordinary startup when machine has been shut down:

- Power on.
- Check all machine surroundings visually for breaks, leaks and objects on the way of the machine (for example the maintenance platform).
- Close all doors (Check that there are no personnel inside the safety area).
- Check warnings and alarms from the Operation panel.
- Push green button to switch control on.
- Switch on AUTO from key switch.
- Before starting to work, do a homing run for the whole machine to check all axis movements.

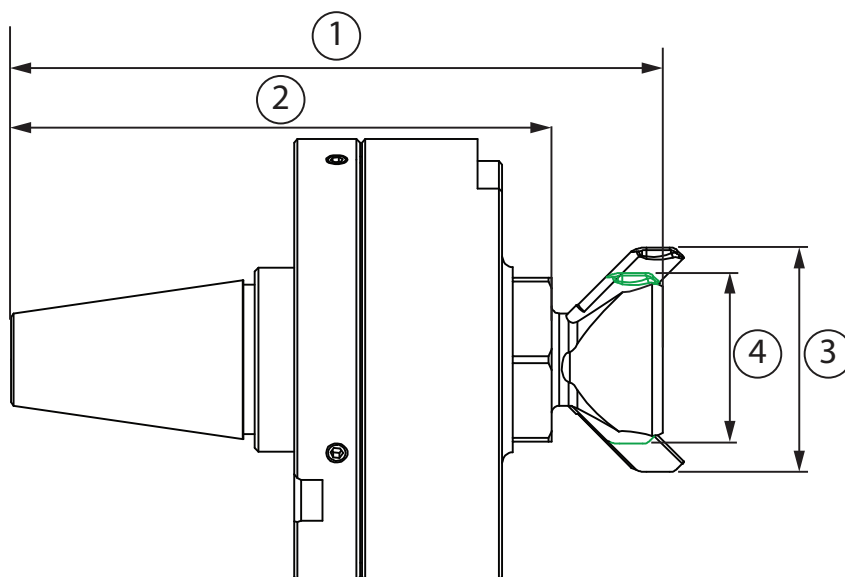
#### 7.1. MACHINE GENERAL SETUP

**Check the following parameters before beginning to place or remove the collaring tool, or starting to make a collar**

1. Tube diameter
2. Tube wall thickness
3. Collar diameter
4. Tool number of the tool that will be used, the tool parameters have to be correct for this certain tool as well.

##### 7.1.1. COLLARING TOOL SETUP

**When the collaring tool is replaced, the new or renewed tool has to be measured and a setup must be done to the program.**



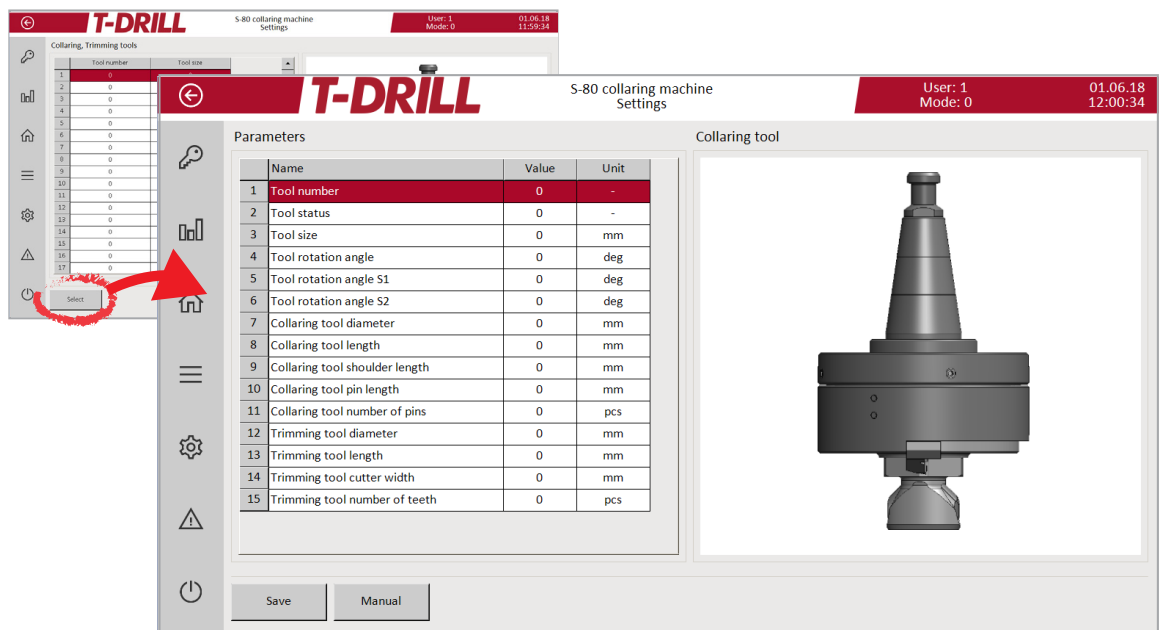
*Measure: 1. Tool length from zero surface to cone top (2) (remove nut and washer to ease measuring) and to tool core end (1). Tool head width with pins fully extended (3) and pins retracted (4).*

The new collaring tool length may differ from the old tool length due to machining.

The tool axis angles affect the positioning of the tool. The angles depend on how tightly the tool is tightened when assembled.

Measure the angle difference of the collaring tool axis and fill it in to the tool parameters on control panel program.

See 6.5.2.1. Collaring tool measuring device 5560252



## 7.3. TOOL MAGAZINE

See 6.5.2.1. Collaring tool measuring device 5560252

The screenshot shows the T-DRILL software interface for the 'S-80 collaring machine'. The top navigation bar includes 'Machine settings', 'Process settings', 'Tool settings', 'Tool magazine', 'Positions', and 'Servo motors'. The 'Tool magazine' screen displays a 3D model of the tool magazine with a green circle highlighting a tool. Below the model is a 'Parameters' table and a 'Servo motors' control panel. Red circles and arrows highlight the 'Tool magazine' menu item and the 'Positions' button.

**Parameters**

Name	Value	Unit
1 10-C	315.00	deg
2 20-X	79.00	mm
3 20-Y	402.00	mm
4 20-Z	80.00	mm
5 30-S1	0.00	deg
6 30-S2	0.00	deg

**Servo motors**

Servo motors

Axis name: 10-C

Actual position: -0.00

Target position: 0.00

Start Stop

Jog movement: - +

Set position

Set actual position for selected axis: Set Set all

Copy / Paste all positions: Copy Paste

Save Export Import

For instructions on program fields: See 6.2.2.3.4. Tool magazine

## 8. MAINTENANCE

To perform machine maintenance, shut down power from the machine main switch and shut down air supply. Lock the main switch and air pressure supply switch with a padlock in order to prevent unauthorized use of the machine or unintended starting.

The machine doors have safety switches, that work as an emergency stop switch.

### Maintenance intervals

Interval	Maintenance	Lubricant / tool	Note
On every tool change	Clean tool with a lint-free cloth and lubricate cone lightly	Use spray oil (Wurth HHS 2000 or equivalent)	No regular maintenance required
Daily	Clean all tools, tool fastening unit, positioning device, spindle chuck, tool store and guides from metal chips and debris	Use a lint-free cloth to clean machine surfaces	
Daily	Check all tube fasteners (tube size specific) and tools before starting to operate the machine		
Daily	Check the condition of all safety devices.		
Daily	Check the chip tray and oil collecting tray, and empty when required.		
Weekly	Check energy chains for wear and tear weekly.	Use a lint-free cloth to clean machine surfaces	
1 month	Lubricate the clamping device centering mechanism.	Vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent	
1 month	S-80 unit inner spindle conical roller bearings	Vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent	2 strokes from the grease gun
1 month	Lubrication of the spindle planetary gear and needle bearing:	Vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent	Lubricate with grease gun: two strokes. There are 2 grease nipples!.

Interval	Maintenance	Lubricant / tool	Note
1 month	The tool locking device thread: Check the lubrication of the thread once a month.	Use Wurth HSS 2000 grease spray or equivalent.	Lubricate the thread if required.
1 month	Check the spindle belts for wear and tightness (3 pcs).	The belt must be able to twist approximately 10°... 15°.	Do not overtighten the belts. (see 8.3. Toothed belts of the S-80 unit)
3 months	Lubricate the spindle lower end bearings	Vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent	Service interval for 2 shift operation and 5 days / week
3 months / 100 hrs	Lubricate the screw jack ball screw drives of X, Y, Z movements	Vaseline: Castrol Tribol GR 4747/220-2 HT or equivalent	Service interval for 2 shift operation and 5 days / week
3 months / 100 hrs	Ball screw drives of X, Y, Z movements	Vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent	The gears are lubricated for life.
3 months	The Hiwin slide blocks, 6 pcs on clamping device, X, Y, Z movement 4 pcs each. (See separate Hiwin manual for details)	Vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent	Service interval for 2 shift operation and 5 days / week

*Lubrication maintenance interval in irregular use: Lubricate after every 30.000 work cycle or 100 km, or at least every 6 months.*

**If the machine is used only occasionally, it is recommended to check and lubricate the machine at least once a year.**

**Wipe of any excess grease from the surfaces.**



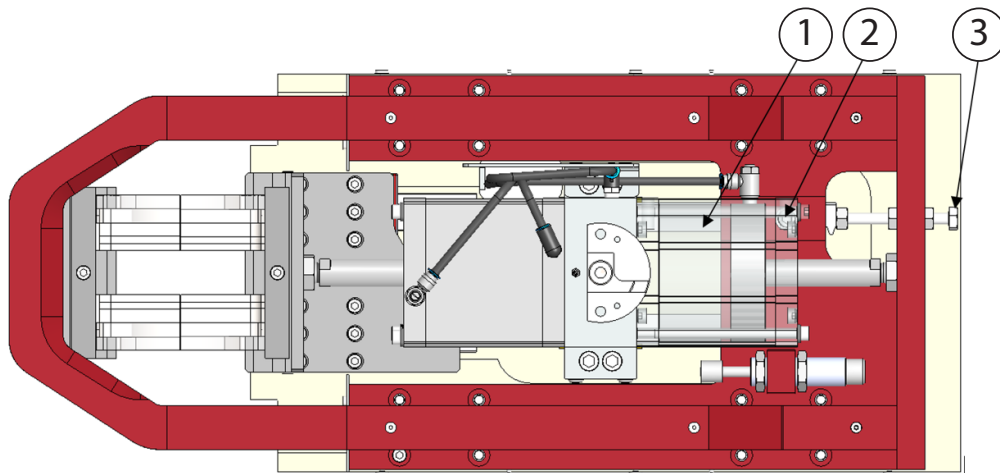
## 8.1. CLAMPING DEVICE MAINTENANCE AND ADJUSTMENT

### Adjustment of the clamping center point

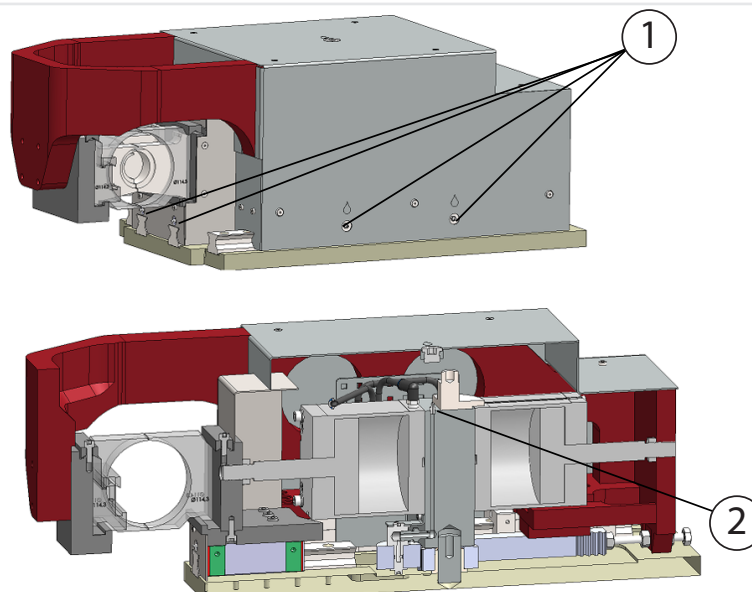
The Manual Feed Table defines the clamping center Y-axis position, because the MFT does not have an adjustment of Y-axis direction. **The adjustment is required if the clamping device has been removed.**

#### Instruction:

1. Remove the posterior pneumatic cylinder (1).
2. Open the locking screws of the toothed rack (2).
3. Place a gauge tube to the MFT. Adjust the clamps by the adjustment screw to grab the gauge tube. Make sure to leave a stroke margin for the clamping cylinder (theoretical 1,5mm+1,5mm).
4. Tighten the locking screws of the toothed rack and the adjustment screw nuts.



### Adjustment of the clamping center point



*Lubricate the clamping device centering mechanism by grease nipples using a grease gun once a month, use vaseline KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent.*

## 8.2. COLLARING UNIT MAINTENANCE AND ADJUSTMENT

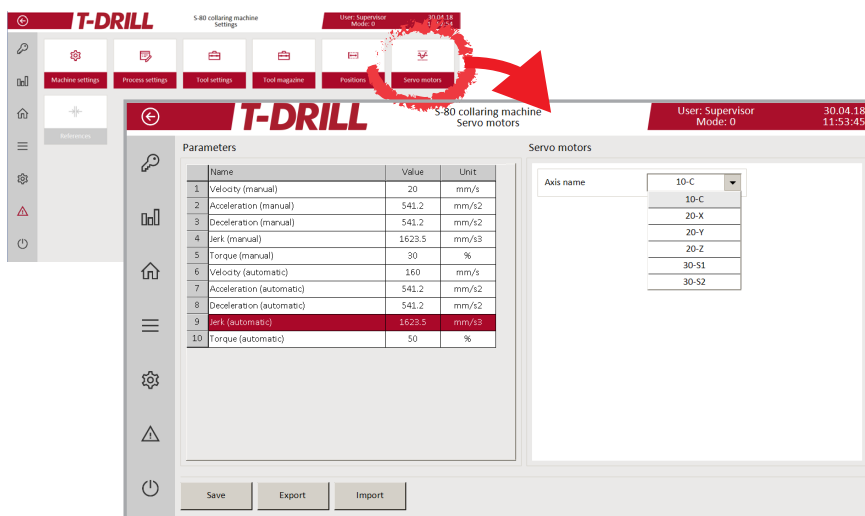
### Setting of the reference for X, Y and Z-axis, and collaring center point

**This setting is only required if the spindle or servo cylinders have been changed.**

The reference setting tool is fixed to the main frame. Set the reference zero point to which all distances are compared to.

Switch the machine to MANUAL from the control panel switch. Place the positioning peg into the milling tool adapter. Place the milling tool adapter to the machine chuck.

Set all torque and speed values to minimum to avoid collision and breakage from the servo screen:



#### Instruction:

X- and Y-axis reference. Lower down the positioning peg very close to the surface of the reference setting point tool using manual screen functions.

Attach a small dial gauge (with magnetic leg) to the spindle axle, and position the peg to the center of the reference setting tool:

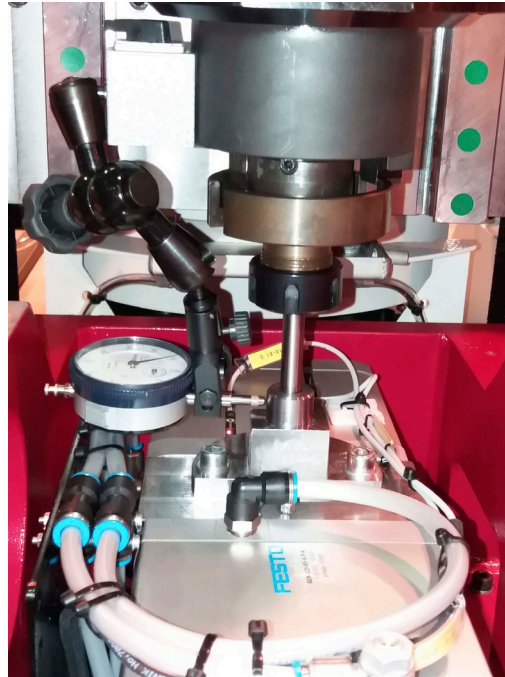
See photo. Point the gauge tip to ref. tool body. Rotate the spindle with hand, drive sideways using manual screen functions and slow speed. (The dial gauge allowed reading difference is 0.01mm).

Set the reference to the machine program from the "Reference" screen.

Position the Z-axis using the same fixed reference tool, remove tool holder and peg first.

Set the torque (manual) to zero, and the spindle will drop down on its own. Let it go down to the surface of the reference tool. Rotate the spindle counter surfaces against the reference tool surfaces.

Set the reference to the machine program from the "Reference" screen.



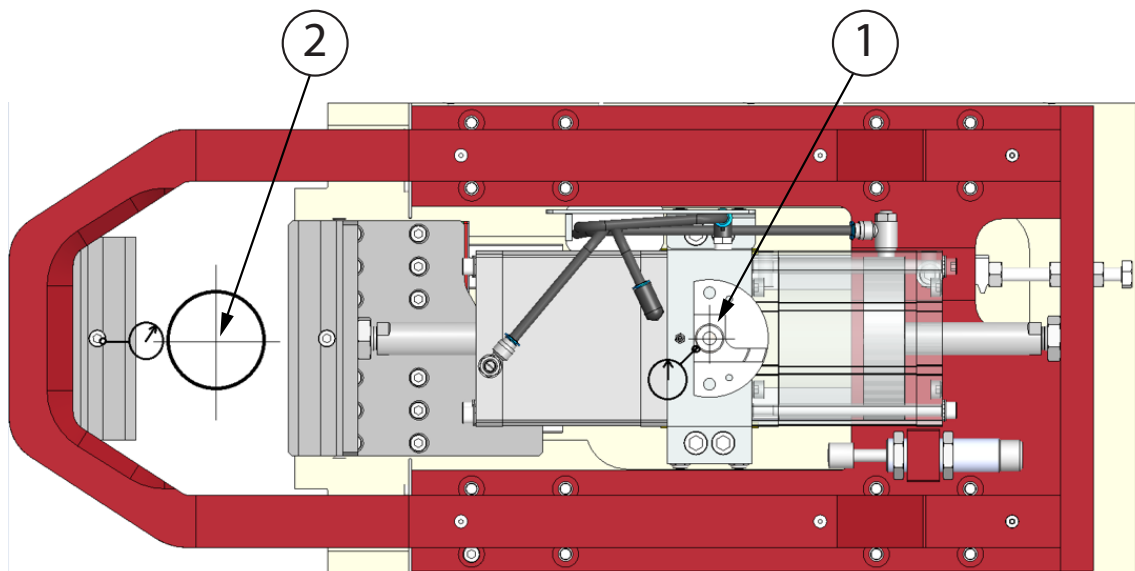
*Spindle, tool holder, peg and the dial gauge.*

### **Collaring center offset value setting**

The collaring center is a programmable value of the clamp center.

Remove tube specific clamps. Attach a small dial gauge (with magnetic leg) to the spindle axle, and position the gauge tip to clamping device horizontal surface. Move the spindle slowly (manual mode) to position it to center of the clamping device.

Save the position to the machine program.



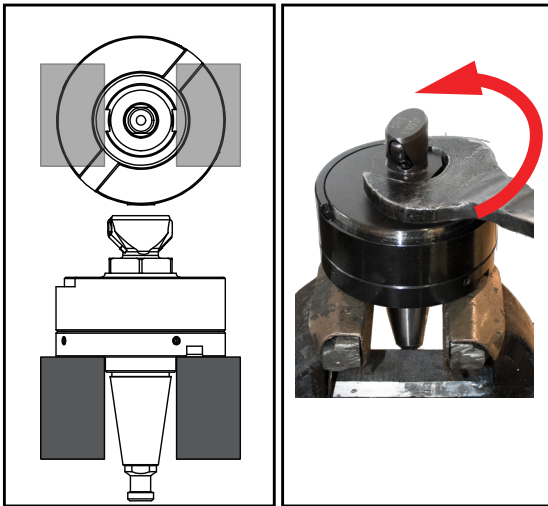
*1. Reference setting point (fixed tool), 2. Tube / clamp center*

### 8.2. COLLARING TOOL MAINTENANCE

➔ **NOTE! Keep the collaring tool clean.**

The collaring tool does not need any regular maintenance. If the collar quality starts to decrease, the collaring pins are worn and have to be renewed.

#### 8.2.1. DISMANTLING AND REASSEMBLING OF THE COLLARING TOOL

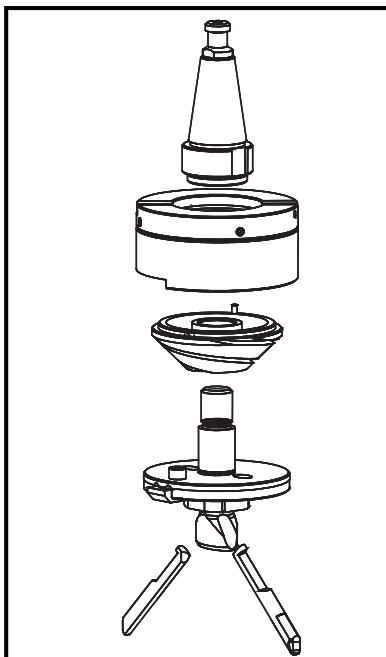


Place the tool to a vice bench or similar to keep steady, the tool is placed to the jaws as shown in the picture.

Place the tool to a vice bench with the cone facing downwards.

Tighten the tool to the vice by the cone bottom.

Open the tool by the hex head (RH thread, spanner size 46).



Turn the head to cone upwards position and screw the cone open.

Beware, the pins may fall out when the drive gear is lifted.



The tool must be tightened very well after assembly.

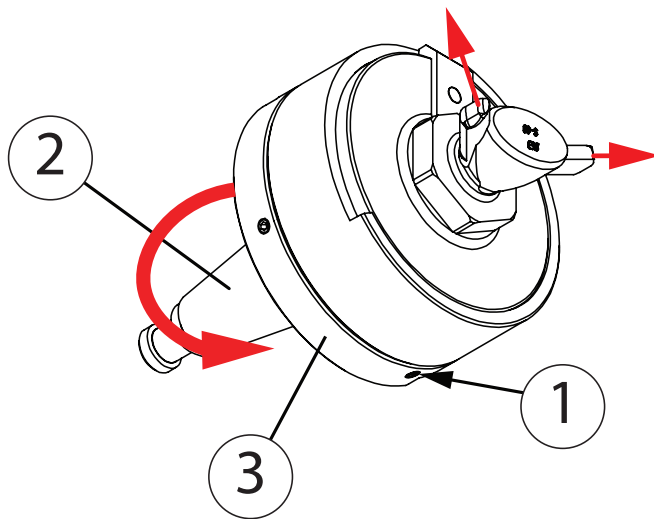
**Tighten to 200Nm.**

After tightening check the operation of the tool (by rotating it by hand)!

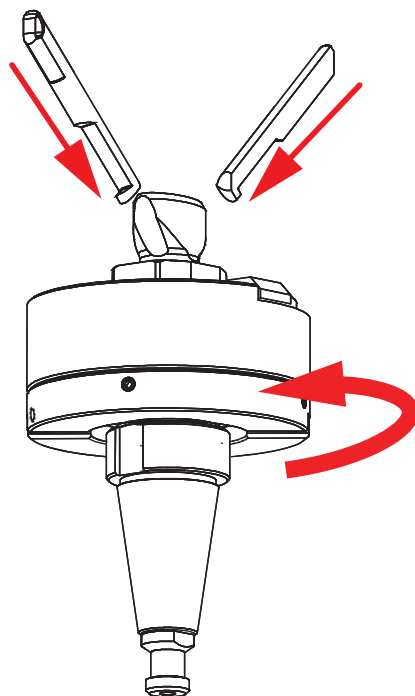
## 8.2.2. REPLACING THE COLLARING PINS

See 6.5.2.2. Removal of the collaring tool: Remove worn tool from the machine.

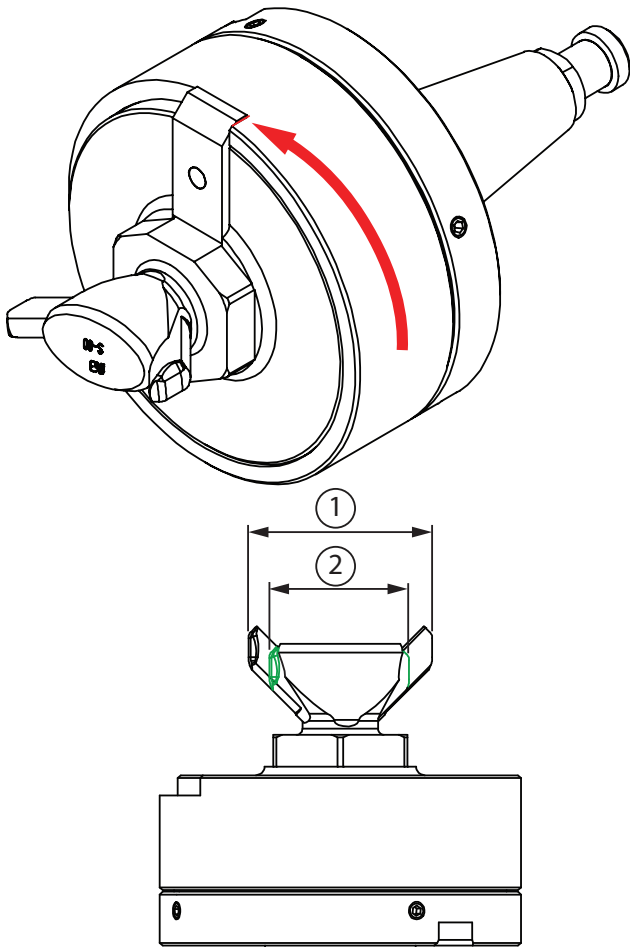
**The collaring tool does not require dismantling when the pins are changed:**



Loosen the four (M6) retainer screws (1). Hold the tool by the cone (2). Rotate the tool cover (3) clockwise (as seen from the cone side) until the pins are fully out. (The tool body may rotate along) Remove the pins.



Place the tool on the table, cone pointing downwards. Put the new forming pins into the holes of the collaring head. Push the pins inward and simultaneously rotate the tool cover counterclockwise until the pins are fully in, and the cover does not turn anymore. Flat surfaces of the forming pins are against each other and the pin lugs (4) are pointing inwards when the pins are in.



### Adjust pin setting distance:

Rotate the drive unit to stopper.

Adjust pins to required MAX width (1, pins out) = collar ID + 3 mm tolerance to enable adjusting in program \*\*.

Measure pin width with a slide caliper.

Close the retainer screws.

TEST the tool by rotating pins out and in by hand, the tool should move steadily and smoothly.

Measure pin width (1) again with a slide caliper.

\*\* The collar size adjustment is recommended to measure from the first collar made with the tool. The collaring pin max width can be adjusted from the program if required.

See 6.2.2.3.2. Collaring tool

(Without the width tolerance the program will end up to an error situation when attempting to adjust).

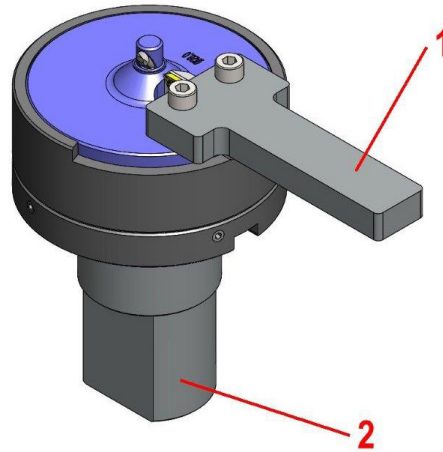
**Measure the tool and do SETUP to program when the tool is installed to the machine. (See chapter 7.1.1. Collaring tool setup).**

Lubricate the pins when assembling the head.

## 8.2.2.1 SMALLER S-80 HEADS : FORK TOOL 6560094

The special tool 6560094 is used to open and tighten smaller tools, that do not have a hex head for the spanner.

The fork tool is fastened to the collaring head, to the bottom of the drill core with two hex bolts.



1. Fork special tool 6560094, 2. Tool cone jig 6560093

The Collaring tool is placed to the Tool cone jig, which is fastened to a vice bench securely.

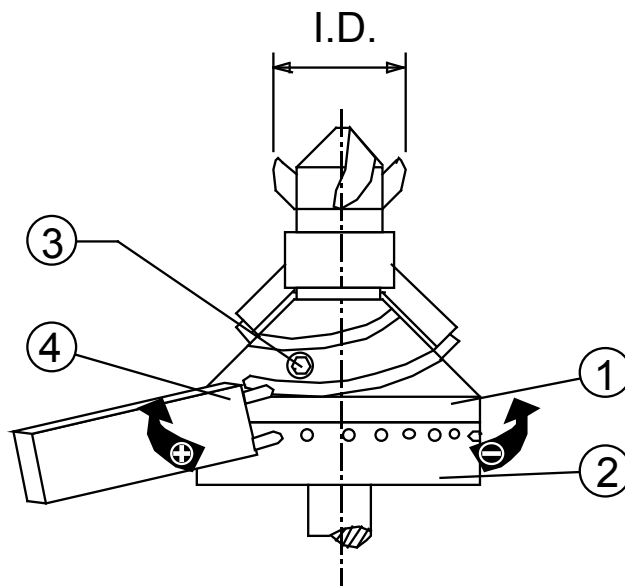
## 8.3. DRILLING COLLARING TOOL MAINTENANCE

<p>1. Top position stopper, fixed to the cone</p>	
<p>2. Set screw for tightening of the tool</p>	
<p>3. Fixing surface of the tool. The flat surface of the head must be on the same side as the set screw.</p>	

The drilling collaring tool is placed to the tool holder cone by pushing it into the cone up to the stopper (1) and tightened with the set screw (2). When tightening turn the collaring head from side to side a bit to make the sloped tightening surface (3) align with the set screw head.

### 8.3.1. THE ADJUSTMENT OF THE HEAD

1. Draw a line on the on the adjustment cone and the brake drum to mark the present setting.
2. Clamp the collaring head by its shank into a bench vice (using however soft jaws, copper or plastic coated, to avoid damage to the shank).
3. Turn the adjustment cone to completely extend the forming pins. Measure the setting (see figure below).



*The adjustment of the collaring head: 1. Adjustment cone, 2. Brake drum, 3. Locking screw, 4. Adjustment tool.*

#### **If an adjustment is required, proceed as follows:**

1. When the forming pins are completely retracted, loosen both locking screws located in the cone.
2. Rotate the cone in relation to the brake drum by means of the special adjustment tool.
  - A: If a larger inner diameter of the collar is required, turn the cone in the (+) direction.
  - B: If the inner diameter of the collar is to be smaller, turn the cone in the (-) direction. The distance between the holes in the brake drum correspond to about 1,1 mm (0,043 inch) in collar inner diameter variation.
3. Tighten one of the locking screws of the cone.
4. Rotate the cone to fully extend the forming pins. Measure once again.
5. If the inner diameter value is alright, tighten both locking screws of the cone carefully. If the inner diameter adjustment is not satisfactory, repeat the procedure (points 1-4).



### 8.3.2. REPLACEMENT AND MAINTENANCE OF THE FORMING PINS

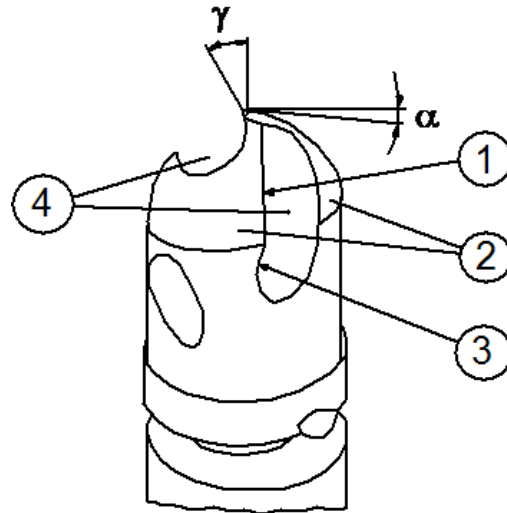
Remove the tool holder cone.

1. Loosen both collaring head locking screws of the cone by 1 - 2 turns.
2. Hold the collaring head in your hand by the break drum or the shank.
3. Rotate the cone clockwise with the other hand until the forming pin lugs reach the end of the cone groove.
4. Pull the forming pins out.
5. Insert new forming pins into the holes and put the pin lugs into the groove of the cone. Rotate the cone counterclockwise to retract the forming pins into the head.
6. Carry out the adjustment of the head as described in chapter "The adjustment of the head".

**➡NOTE!** If the forming pins are caked with residue material, remove the material carefully by polishing the pins. Any material caked to the pins reduces the surface quality and the precision of the collar, which increases the strain on the head and the pins, thus shortening the tool's life expectancy.

### 8.3.3. RESHARPENING OF THE DRILL BIT

➔ **NOTE!** Resharpener of the drill bit demands a special professional skill - a wrongly sharpened drill bit reduces the quality of the collar.



The parts of the bit:  $\alpha$  = Clearance angle,  $\gamma$  = Chisel edge angle, 1. Cutting edge, 2. Body clearance surface (land), 3. Rake face, 4. Flute.

The patented cutting geometry of the T-DRILL bit is designed in such a way that a perfect pilot hole without burrs can be achieved at a low feed rate. However, this presupposes that the cutting edge is always kept sharp.

#### When do we have to sharpen?

When the cutting performance of the bit declines, it does not seem to penetrate the tube surface easily or burrs occur on the edge of the pilot hole, it is time to sharpen. (Note! Burrs may also be a sign of insufficient lubrication). Use of a dull bit must be avoided, because a dull bit wears out very quickly and thus its life expectancy will be relatively short.

#### Where do we sharpen?

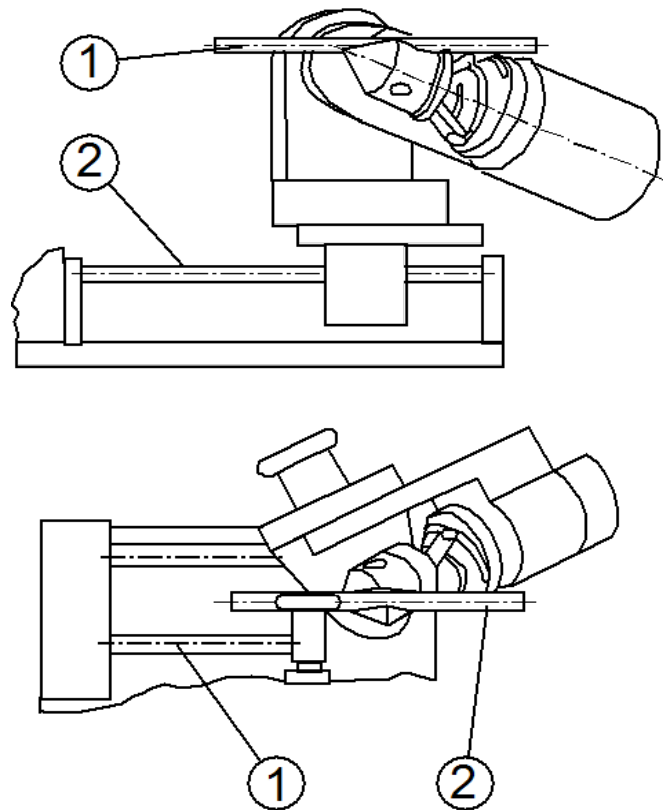
The bit is sharpened at the rake face only. The body clearance surface is never to be sharpened, because even the slightest variation in the landing angle will radically reduce the cutting characteristics of the bit.

For the sharpening the following equipment is needed:

- A tool grinding machine equipped with a vertically tiltable rotary table
- A fine-grained, thin grinding wheel which fits in the flute
- A straight pin which fits in the cutting-groove by means of which it is easier to set the bit in the correct position.

#### The correct positioning for grinding

1. Fasten the drill shank in the clamping fixture and put the straight pin into the flute. Set the pin parallel with the slide bars of the grinding machine carriage both vertically and horizontally. (See figure next).



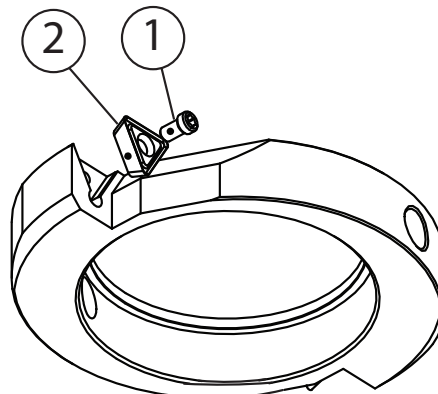
*The correct positioning for grinding: 1. Slide bars of grinder, 2. Straight pin.*

### 8.3.4. THE TRIMMING BLADE CUTTING INSERTS

The trimming blade cutting inserts are triangular in shape, and can be turned three times to use all edges. To remove blade open fixing screw CSTB-2,5.

When the trimming quality is not as desired, the blades can be either turned or changed.

➔ **NOTE!** Always turn / change both cutting inserts on the blade holder at once.

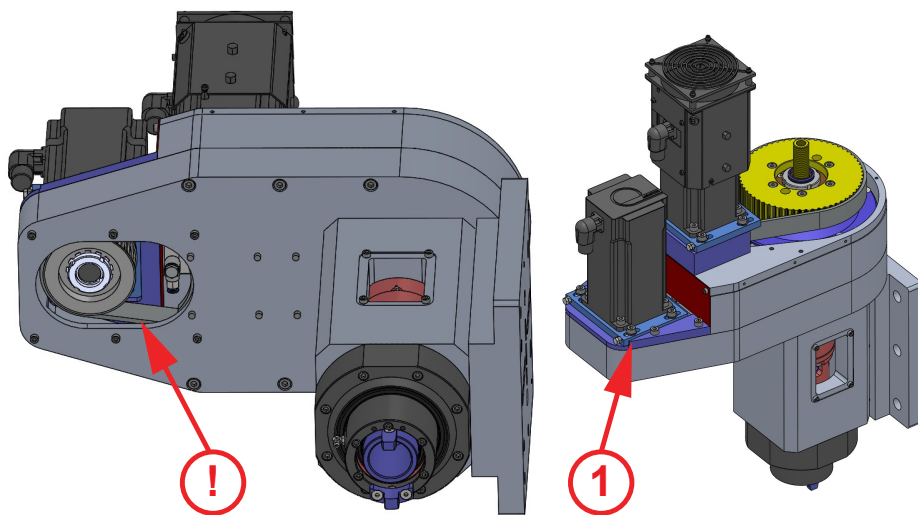


*1. Fixing screw CSTB-2,5, 2. Trimming blade cutting insert*

### 8.4. TOOTHED BELTS OF THE S-80 UNIT

Check the condition and tightness of the spindle belts once a month, when the lubrication maintenance is done.

#### Bottom belt



Open the cover below the machine.

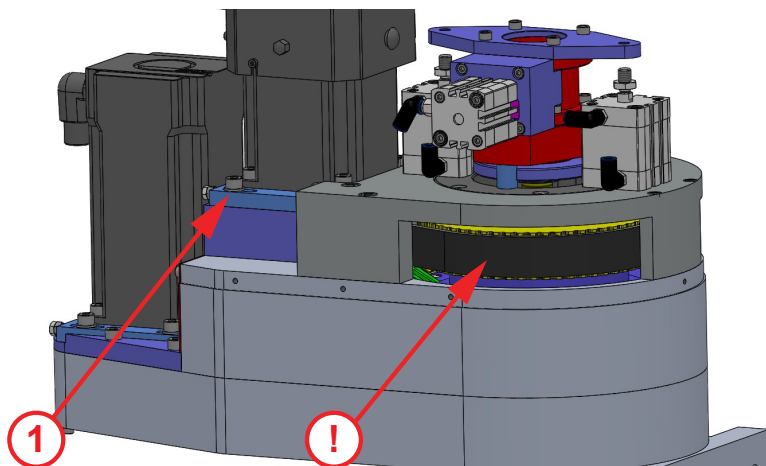
Test the belt tension by hand.

If the belt seems to have excessive slack, adjust the tension by the servo motor mounting pedestal adjustment screws (1).

#### Avoid overtightening!

The belt must be able to twist approximately 10°... 15° (take a firm grip from the belt and twist it with your fingers, the belt is too tight if it does not allow to twist!).

#### Top belt



Open the top cover of the machine.

Test the belt tension by hand.

If the belt seems to have excessive slack, adjust the tension by the servo motor mounting pedestal adjustment screws (1).

#### Avoid overtightening!

The belt must be able to twist approximately 10°... 15° (take a firm grip from the belt and twist it with your fingers, the belt is too tight if it does not allow to twist!).

## 8.5. SCREWJACK AND BALL SCREW DRIVE MAINTENANCE

The Z and GSZ series ZIMM Screw Jack are sealed and are filled with high-quality synthetic low-viscosity grease; from size 250 kN they are filled with synthetic oil. Under normal operating conditions the gearbox is lubricated for life.

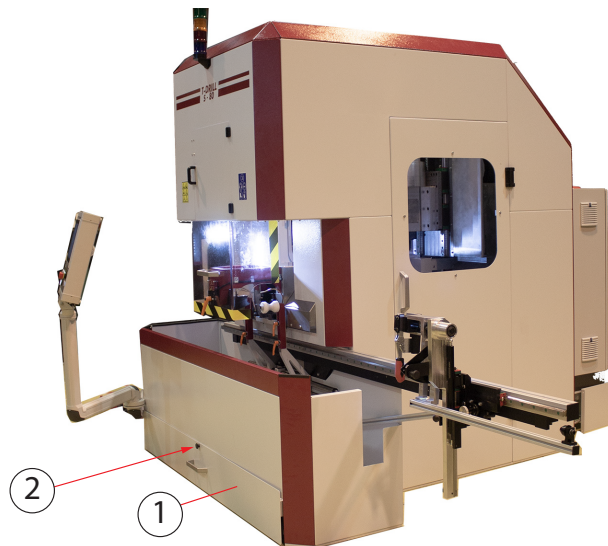
Lubricate the screw jack ball crew drive of X, Y, Z movements every three (3) months (when interval is 2 shift operation and 5 days / week).

**For detailed maintenance instructions for Zimm screwjacks and accessories, refer to separate manual.**

## 8.6. OIL COLLECTORS

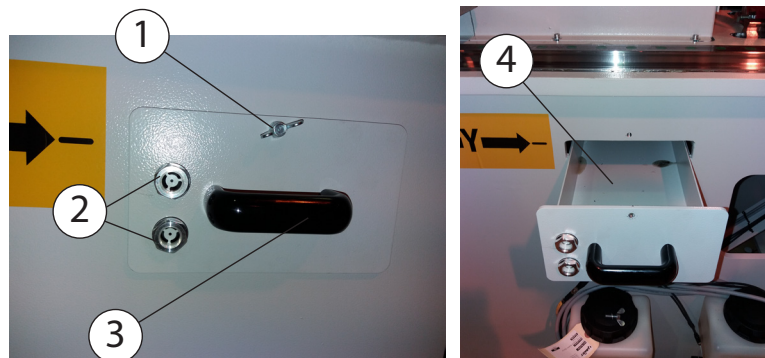
Check the large chip tray and oil and debris collecting tray daily, and empty when required.

**The large chip tray is positioned in front of the machine, under the clamps.** To open the tray, release locking from the knob and pull out the tray. The tray has wheels under it.



1. Large chip tray, 2. Locking knob

**The oil and debris collecting tray is positioned on the left side of the machine frame, under the tool magazine.** The tray has oil level sight glasses on the front panel.



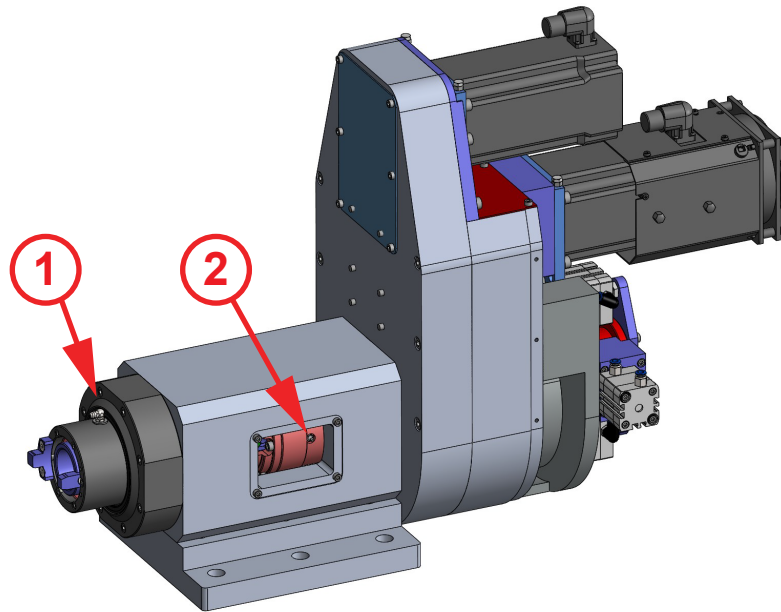
Oil and debris bin under the tool magazine: 1. Winged locking screw, 2. Oil sight glass, 3. Handle, 4. Bin.

## 8.7. SPINDLE LUBRICATION MAINTENANCE

Turn the main switch off (0). Lubricate the following points by the grease nipples, use a grease gun:

### 1. The spindle bearing

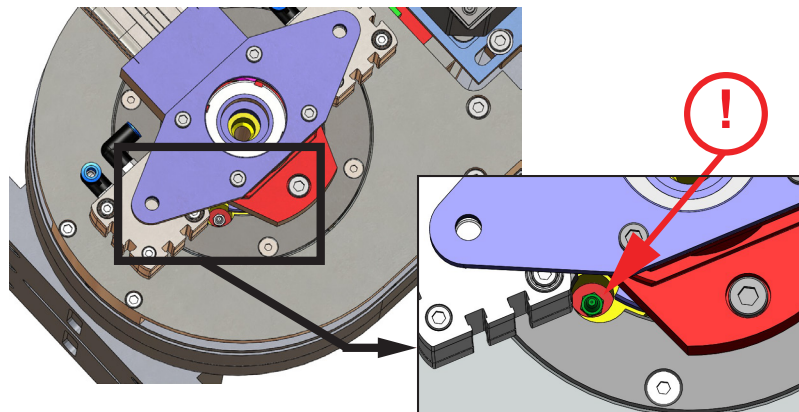
Service interval for 2 shift operation and 5 days / week: 3 months.



2. S-80 unit inner spindle conical roller bearings:  
Open the cover on the spindle side.  
Lubricate with grease gun: two strokes.

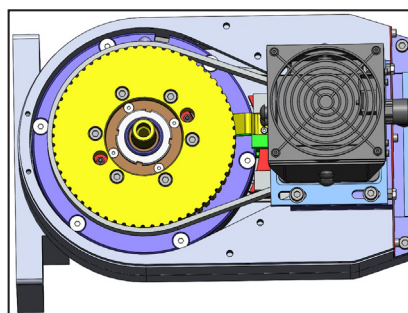
Service interval for 2 shift operation and 5 days / week: 1 month.

3. Lubrication of the planetary gear and needle bearing:  
There are 2 grease nipples, only one visible at the time.  
The inner spindle (gear) must be rotated 180° to reach the other nipple. Rotate from the upper belt, push the belt to rotate with thumbs.

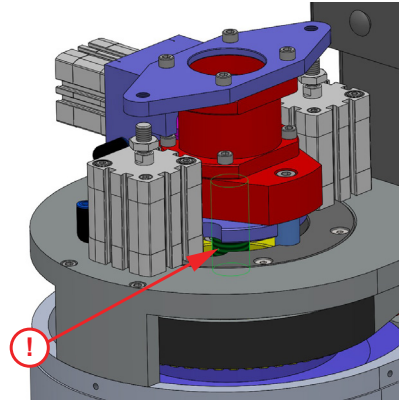


Lubricate with grease gun: two strokes.  
Service interval for 2 shift operation and 5 days / week: 1 month.

(The lower picture shows the gear under the locking device).



4. The tool locking device thread: Check the lubrication of the thread once a month. Lubricate the thread if required. Use Wurth HSS 2000 grease spray or equivalent.



*All other bearings of the S-80 unit are sealed and lubricated for lifetime.*

**To perform the lubrication, proceed as follows:**

1. Turn the main switch off (0).
2. Lubricate the above-mentioned parts (especially part 3) with vaseline: KLÜBER ISOFLEX TOPAS L152 (NLGI 2) or equivalent.

**If the machine is used only occasionally, it is recommended to check and lubricate the machine at least once a year.**

## 9. TROUBLESHOOTING

Problem	Cause	Remedy
The screen of the control panel is blank	Power supply not connected	Connect current / Check that main switch of the S-80 is in ON position.
Machine doesn't move	The emergency switch knob has not been released The safety light curtain has not been reset	After having pushed the emergency switch, the machine will not start again unless releasing the STOP-switch and pushing the safety curtain reset button.
Work cycle doesn't start	Light curtain has been interrupted.	Reset the light curtain
Machine stops in the middle of the work cycle	Emergency stop or the safety light curtain was interrupted in the middle of the work cycle.	Reset Emergency Stop and curtain and Do Homing. A controlled machine reset is done by pushing the Reset button continuously for 10 seconds.
Tap "Homing" on screen: ALARM: Homing sequence cannot be started	Air pressure off	Check air pressure line, switch on air pressure to the collaring unit: press Reset on control panel
	Lifting cylinder not down (20-B1.0) Locking cylinder not in the middle (20-B2.1) or Lifting cylinder not up (20-B1.1) Locking cylinder not on the side (20-B2.0)	Check the cylinder positions and move to correct position using MANUAL
	Are collaring settings OK?	Check settings.
	Are tool settings OK?	Check settings.



Problem	Cause	Remedy
Tap "Tool fasten" on screen: ALARM: Tool fasten sequence cannot be started	Air pressure off	Check air pressure line, switch on air pressure to the collaring unit: press Reset on control panel
	Lifting cylinder not down (20-B1.0)	Check the cylinder positions and move to correct position using MANUAL
	Locking cylinder not in the middle (20-B2.1)	
	Work piece sensor not activated (10-B4)	Check work piece sensor, the locking piece must activate sensor.
	Are collaring settings OK?	Check settings.
	Are tool settings OK?	Check settings.
Tap "Tool release" on screen: ALARM: Tool release sequence cannot be started	Air pressure off	Check air pressure line, switch on air pressure to the collaring unit: press Reset on control panel
	Lifting cylinder not up (20-B1.1)	Check the cylinder positions and move to correct position using MANUAL
	Locking cylinder not on the side (20-B2.0)	
	Work piece sensor not activated (10-B4)	Check work piece sensor, the locking piece must activate sensor.
	Are collaring settings OK?	Check settings.
	Are tool settings OK?	Check settings.

Problem	Cause	Remedy
Tap "Cycle start" on control panel: ALARM: Collaring process cannot be started	Air pressure off	Check air pressure line, switch on air pressure to the collaring unit: press Reset on control panel
	Is the collaring tool fastened properly?	
	Lifting cylinder not up (20-B1.1)	Check the cylinder positions and move to correct position using MANUAL
	Locking cylinder not on the side (20-B2.0)	
	Work piece sensor is activated (10-B4)	Check work piece sensor, there should be nothing pushing sensor.
	The S1 and S2 axis are not in home / start position (+/- 2 deg)	Do homing.

**If the problem is not solved with the help of trouble shooting instructions, contact your local T-DRILL dealer.**

### Give your contact information

- The name of the company
- Your own name and position
- Telephone number
- Fax number
- e-mail –address

### To accelerate the problem solution, please give the following information:

- The serial number of the machine
- Type code
- The reading of the piece counter
- Short description of the appeared problem.

## 10. WARRANTY

T-DRILL OY's normal warranty for the S-80 collaring machine is one (1) year from the date it has been taken in use, which however shall not later than 18 months from delivery of the machine.

The warranty covers defects in materials and workmanship, other than normal wear and tear. The warranty does not cover the tools. Should any defects in the S-80 collaring machine appear and ascertained by T-DRILL, such machine will be repaired in the way T-DRILL finds best.

The obligation to inform the manufacturer of any defect is exclusively the responsibility of the customer. T-DRILL must receive any such information in writing within 10 days after a defect having been noticed.

T-DRILL'S warranty shall be limited to the aforesaid guarantee stipulations.

T-DRILL SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHER THEORIES OF LAW, WITH RESPECT TO PRODUCTS SOLD OR SERVICES IMPLICATED, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO. T-DRILL SHALL NOT BE LIABLE FOR AND DISCLAIMS ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.

## 11. SAFETY DATA REGARDING THE LUBRICANTS

The safety data sheets regarding the following lubricants are sent together with the lubricants:

- Petrofer Drawlub TD 50

## 12. ORDERING SPARE PARTS

When ordering spare parts, please state the following details:

- Type code of the machine
- Manufacturing code of the machine
- The part number
- A description of the part
- The quantity of the parts required

The type code and manufacturing code of the machine are indicated on the nameplate of the machine. The other information can be found from parts list.

For example:

### 10.1. CLAMP SUPPORT <168 5500896

Item	Part No.	Name	Size/Type	Std./Manuf.	Qty
1	3500903	Clamp frame			2
2	3500904	Fastening plate			2
3	9214010	Screw	M8 x 25	8.8 DIN7984	8
4	9016007	Set screw	M8 x 8	12.9 DIN913	4
5	4280104	Clamp holder pin			4
6	9018037	Parallel pin	Ø6m6 x 32	DIN6325	4
7	9018219	Spring pin	Ø6 x 30	DIN1481	2



1. Part number 2. Description 3. Quantity

When ordering spare parts, send an e-mail or a fax.

By proceeding this way you will prevent misunderstandings, and you make sure to receive the correct spare parts and a prompt service.

Contact information:	Global	USA, Mexico, Canada
Spare part inquiries and orders	sales@t-drill.fi	sales@t-drill.com
Technical support	service@t-drill.fi	service@t-drill.com
Fax:	+358-6-4753 383	(+1) 770-925-3912
Telephone:	+358-6-4753 344	(+1)770-925-0520 ext. 245

## 13. APPENDIX

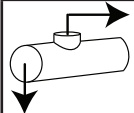
### 13.1. CAPACITY TABLE

With the aid of the capacity charts on the following pages you will be able to determine the max. wall-thickness of the tube and select the right collaring head.

#### Instructions for the use of the capacity charts:

1. From the horizontal black row, find the collar size you need, and from the vertical black column the diameter of your run tube.
2. The intersection of the horizontal and vertical rows will show you the max. wall thickness of the tube. This value is not to be exceeded.

**Example: Run tube  $\varnothing 12$ , collar  $\varnothing 10$ :**

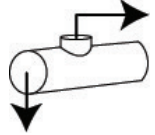


	$\varnothing 6$	$\varnothing 8$	$\varnothing 10$	$\varnothing 12$	$\varnothing 15$
$\varnothing 8$	0.5	0.5			
$\varnothing 10$	0.8	0.8	1.0		
$\varnothing 12$	0.8	1.0	1.0	1.0	
$\varnothing 15$	0.8	1.0	1.0	1.0	1.2
$\varnothing 18$	0.8	1.0	1.0	1.0	1.2
$\varnothing 22$	0.8	1.0	1.2	1.2	1.5
$\varnothing 25$	0.8	1.0	1.2	1.2	1.5
$\varnothing 28$	0.8	1.0	1.2	1.2	1.5
$\varnothing 35$	0.8	1.0	1.2	1.2	1.5

- Wall thickness 1.0 or less

**➡NOTE!** These tables have been established to give directive information. We reserve ourselves the right to change the figures. For wall thicknesses and pipe dimensions others than the ones indicated: please do contact your T-DRILL dealer.

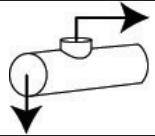
Max.wall thickness S in millimetres (mm) S-80 collaring tools (separate pilot hole milling tool)



	Branch O.D.								
	Ø 19	Ø 23	Ø 25	Ø 28	Ø 30	Ø 34	Ø 38	Ø 51	Ø 63,5
Ø19	-	-	-	-	-	-	-	-	-
Ø23	1.5	1.5	-	-	-	-	-	-	-
Ø25	1.5	1.5	2.0	-	-	-	-	-	-
Ø28	1.5	1.5	2.0	2.0	-	-	-	-	-
Ø38	1.5	1.5	2.3	2.3	2.6	-	-	-	-
Ø51	1.5	1.5	2.3	2.3	2.6	2.6	-	-	-
Ø60.3	1.5	1.5	2.3	2.3	2.9	2.9	2.9	-	-
Ø63.5	1.5	1.5	2.3	2.3	2.9	2.9	2.9	3.0	-
Ø76.1	1.5	1.5	2.3	2.3	2.9	2.9	2.9	3.0	3.0
Ø88.9	1.5	1.5	2.3	2.3	2.9	2.9	2.9	3.0	3.0
Ø114.3	1.5	1.5	2.3	2.3	2.9	2.9	2.9	3.0	3.0

Grey base on table: available Specma clamping tool sizes


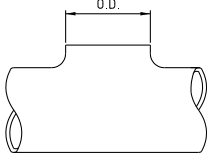
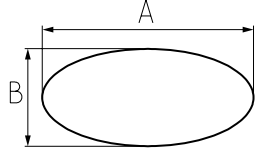
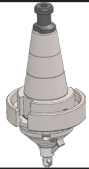
Max.wall thickness S in millimetres (mm) S-80 hybrid collaring tools (with drilling feature, round pilot hole, drill Ø9.6mm)



	Branch O.D.	Branch O.D.	Branch O.D.
	Ø 19	Ø 25	Ø 34
Ø19	1.2	-	-
Ø23	1.2	-	-
Ø25	1.2	1.2	1.2
Ø28	1.2	1.2	1.4
Ø38	1.2	1.4	1.4
Ø51	1.2	1.4	1.4
Ø60.3	1.2	1.4	1.4
Ø63.5	1.2	1.4	1.4
Ø76.1	1.2	1.4	1.4
Ø88.9	1.2	1.4	1.4
Ø114.3	1.2	1.4	1.4

Grey base on table: available Specma clamping tool sizes

**13.2. PILOT HOLE TABLE**

				
Run pipe O.D. mm	Branch pipe O.D. mm	Pilot hole a mm	Pilot hole b mm	S-54 adapter tool drill Ø mm
Ø23	Ø19	11	8	9.6
Ø25	Ø19	11	8	9.6
	Ø23	15	12	
Ø28	Ø19	11	8	9.6
	Ø23	15	12	
	Ø25	17	13	
Ø38	Ø19	12	8	9.6
	Ø23	15	12	
	Ø25	17	13	
	Ø28	19	13	
	Ø30	21	13	
	Ø34	23	13	
	Ø38	28	17	
Ø51	Ø19	11	8	9.6
	Ø23	15	8	
	Ø25	17	13	
	Ø28	19	13	
	Ø30	21	13	
	Ø34	23	14	
	Ø38	28	18	
Ø60.3	Ø19	11	8	9.6
	Ø23	15	12	
	Ø25	17	13	
	Ø28	19	13	
	Ø30	21	13	
	Ø34	21	16	
	Ø38	28	18	
	Ø51	39	25	

Run pipe O.D. mm	Branch pipe O.D. mm	Pilot hole a mm	Pilot hole b mm	S-54 adapter tool drill $\varnothing$ mm
Ø63.5	Ø19	11	8	9.6
	Ø23	15	12	
	Ø25	17	13	
	Ø28	19	13	
	Ø30	21	13	
	Ø34	23	13	
	Ø38	28	17	
	Ø51	39	25	
	Ø63.5	52	28	
Ø76.1	Ø19			9.6
	Ø23			
	Ø25			
	Ø28			
	Ø30			
	Ø34			
	Ø38			
	Ø51			
	Ø63.5	50	32	
Ø88.9	Ø19			9.6
	Ø23			
	Ø25			
	Ø28			
	Ø30			
	Ø34			
	Ø38			
	Ø51			
	Ø63.5			



Run pipe O.D. mm	Branch pipe O.D. mm	Pilot hole a mm	Pilot hole b mm	S-54 adapter tool drill $\varnothing$ mm
$\varnothing 114.3$	$\varnothing 19$	11	8	9.6
	$\varnothing 23$	15	12	
	$\varnothing 25$	17	13	
	$\varnothing 28$	19	15	
	$\varnothing 30$	20	13	
	$\varnothing 34$	21	17	
	$\varnothing 38$	28	17	
	$\varnothing 51$	37	29	
	$\varnothing 63.5$	50	32	

**Grey base on table: available Specma clamping tool sizes**

This table is intended as a guide only.

The values depend on the pipe materials and wall thicknesses as well as on the condition of the tool used.

**➔NOTE! Two sizes of S-80 milling pin: Select the 8 mm milling pin as soon as the pilot hole size allows. Approx measurement  $b > 15$ .**

# More T-DRILL products for collaring and flanging



**SEC-100 TBC**

Automatic Tube Collaring System for multiple collars with 2-axis positioning up to 114.3 mm collars.



**PLUS-500**

T-DRILL PLUS-500 is a powerful and competitive collaring system for large pipe/vessel collaring by one operator for most malleable materials.



**T-110**

Transportable Collaring Unit for both factory and on-site

- Collar sizes 21.3 - 114.3 mm
- Run tube sizes 33.7 - 323.9 mm



**TEC-150 HD**

Heavy Duty Collaring Station

- Collar sizes 21.3 - 219.1 mm
- Run tube sizes 33.7 - 804 mm



**F-SERIES**

Flanging machines for both cold and hot forming

- Tube diameters: 21.3 - 419 mm
- Wall thickness up to 9 mm depending on the material and tube diameter

