T-DRILL

PRODUCTIVITY AS A PRODUCT.

INSTRUCTION MANUAL
SPARE PARTS LIST

COLLARING MACHINE

T-65CU

Version

6330705EN EU F
06.02.2018 / MT
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Original instructions

This instruction manual includes a spare parts list and instructions for set-up, operation and maintenance of the **T-DRILL T-65 tee forming machine for copper**.
Type code : 3305

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Is 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.

CONTENTS

1. NOTES ON THE USE OF THE INSTRUCTION MANUAL

1.1 SYMBOLS AND WARNINGS

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

➡NOTE! May cause an accident or damage other property, if the right precautionary measures have not been taken.

ⓘ DANGER! May cause a serious accident or death, if the right precautionary measures have not been taken.

This instruction manual includes instructions for set-up, operation and maintenance of the T-DRILL T-65 tee forming machine. This book also includes instructions on how to use and select T-Drill heads for hand tools.

➡NOTE! Before carrying out any actions, read chapter 2 ”Safety Instructions”.

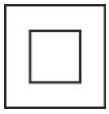
Get acquainted with the instruction manuals of the MILWAUKEE DRILL delivered with the machine before using the T-65 machine.

Acquaint yourself with the machine before using it. Read the operation sequence described in the instruction manual thoroughly before preparing, operating or maintenance of the machine.

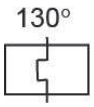
IMPORTANT! Save these instructions for future use!

1.2 SYMBOLISM

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

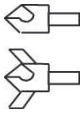


Double insulated.



Thermally protected to 130◦C

Warning! Do not dispose as waste. Please recycle



Warning! Watch your fingers. Rotating tool!

2. GENERAL SAFETY INSTRUCTIONS

Read all the instructions before using the machine.

Know your power tool - Read the instruction manual carefully. Make sure to be fully aware of your skills and limitations and keep in mind the potential hazards specific to this tool.

ⓘ DANGER! - The use of any accessory or attachment other than the ones recommended in this operating instruction or T-DRILL catalogue may create a risk of personal injury.

➡NOTE! Never detach the MILWAUKEE power unit from the T-DRILL tee forming unit. Detaching the power unit will damage the alignment made in factory.

➡NOTE! The T-DRILL T-65 is designed for use with MILWAUKEE power unit. Using any other power units with the T-DRILL T-65 tee forming unit is not allowed.

IMPORTANT! Detaching the power unit from the tee-forming unit will void the warranty!

2.1 GENERAL SAFETY INSTRUCTIONS FOR WORK AREA

Keep work area clean – Cluttered areas and benches invite injuries.

Consider work area environment – Don't use power tool in humid or wet conditions. Keep work area well illuminated. Don't use power tool in the presence of flammable liquids or gases.

Keep children away – Do not let visitors touch the tool or it`s extension cord. All visitors should be kept away from work area.

Stay alert – Be aware of what you are doing. Use common sense. Do not operate tool when you are tired.

2.2 SAFETY INSTRUCTIONS FOR TOOL

Store idle tools – when not in use, tools should be stored in dry, high, or locked-up place, out of the reach of children.

Don't force tool – It will do the job better and safer at the rate for which it is intended.

Dress properly – Do not wear loose clothing or jewelry. They can be caught in moving parts. Use appropriate gloves and footwear. Wear protective hair covering to contain long hair.

Use safety glasses – Also use face or dust mask if cutting operation is dusty.

Secure work – Use clamps or a vise to hold your work piece. It's safer than using your hand and it frees both hands to operate the tool.

Don't overreach – Keep proper footing and balance at all times.

Maintain tools with care – Keep tools sharp and clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and, if damaged, have them repaired by authorized service workshop. Inspect extension cords periodically and replace if damaged. Keep handles dry, clean and free from oil and grease.

Don't abuse cord – Never carry a tool by its cord or yank it to disconnect it from receptacle. Keep cord from heat, oil and sharp edges.

Disconnect tools – When not in use, before servicing, and when changing accessories such as blades, bits and cutters.

Remove adjusting keys and wrenches – Make it a rule to check that keys and adjusting wrenches are removed from tool before turning it on.

Avoid accidental starting – Do not use a tool if the power switch does not turn the tool on and off. Do not carry the tool with your finger on the switch.

Outdoor use extension cords – When tool is used outdoors, use only extension cords intended for use outdoors and so marked.

Check damaged parts – Before further use of tool, a guard or other part that is damaged should be carefully checked to determinate that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced by an authorized service unless otherwise indicated elsewhere in this instruction manual. Have defective switches replaced by an authorized service. Do not use tool if switch will not turn it on and off.

Have your tool repaired only by T-DRILL – This electric tool is in accordance with the relevant safety requirements. Repairs should be carried out only by certified persons using original spare parts; otherwise, this may result in considerable danger to the user.

Keep tools away from items that may be damaged by magnets – The motor contains a powerful magnet that may damage magnetic tape, credit cards, computer disks and watches.

Use ear protectors. During operation the noise level of the collaring machine may exceed 95dB(A).

The vibration exercised on the operator's hand is less than 2.5 m/s.

2.2.1 T-65B BATTERY AND CHARGER SPECIFIC WARNINGS

ⓘ DANGER! To reduce the risk of injury or explosion, never burn or incinerate a battery pack even if it is damaged, dead or completely discharged. When burned, toxic fumes and materials are created.

ⓘ DANGER! Charge only MILWAUKEE 28 Volt Lithium-Ion battery packs in MILWAUKEE 28 V Li-ion battery chargers. Other types of batteries may cause personal injury and damage.

ⓘ DANGER! To reduce the risk of injury, always unplug the charger and remove the battery pack from the charger before performing any maintenance. Never disassemble the battery pack or charger. Contact a MILWAUKEE service facility for ALL repairs. To reduce the risk of injury and damage, never immerse your battery pack or charger in liquid or allow a liquid to flow inside them.

2.3 SAFETY INSTRUCTIONS FOR TEE FORMING

Do not touch the rotating tool when the work cycle is on.

When fixing the machine to the tube, be careful not to leave your fingers between the machine and the tube.

When handling the tools, be careful with the cutting blades. Use protective gloves.

A falling machine or tool may damage your feet. Use protective shoes.

The lubricating oil you use may cause irritation of the skin. Use protective gloves.

The fumes emitted by the lubricant may irritate your eyes and hinder your respiration. Pay attention to an adequate ventilation.

Make yourself familiar with the contents of the safety data sheet regarding the lubricants.

The loosening chips are hot and sharp. Provide adequate protection in order not to get damaged.

Be careful to avoid accidental starting of the machine when handling it. Never carry the tool with your finger on the trigger.

When cleaning the collar always use protecting gloves. The edges of the collar use to be sharp.

Do not use inadequate protecting gloves, because they may get caught by the rotating tool. Keep your hands off the dangerous area.

Use safety gloves when operating with the machine

3. GENERAL INFORMATION ON T-DRILL T-65

3.1 INTRODUCTION

The T-DRILL T-65 is a special tool intended for mechanically forming tees in copper tube typically found in domestic, commercial and industrial tubing systems. The T-65 extrudes in the run tube an outlet, to which the branch tube can be joined by brazing.

Before attempting to put the T-65 into service, make sure you have read and fully understood the safety instructions which apply to all power tools and capabilities of this special tool.

The T-DRILL T-65 includes an electric network driven power unit with accessories. The power unit is grounded 120V /60Hz or double insulated 230V /50Hz (sold in Europe). The T-DRILL T-65B is a cordless version of the machine with 28V Lithium-ion battery.

3.2 THE PARTS OF THE T-65

1. T-DRILL head, 2. Chuck ring, 3. Tube support, 4. T-DRILL tee forming unit, 5. Power unit, 6. Connecting cord, 7. Battery of the T-65B

3.3 INFORMATION ABOUT ACCESSORIES

For versatile use of T-DRILL T-65 the following accessories are available:

Notcher ND-54

Tube end notcher forms the end of branch pipe to match inner curve of the run tube. In this way maximum flow is achieved. The notcher also presses two dimples simultaneously in the end of the branch tube, one acting as a depth stop and the other one for inspection of the joint after brazing.

Gauge Block and rings

Correct size settings of the T-DRILL head for various tube sizes can easily be checked with the gauge block. The range of size is NS 1/4”-1” with the gauge block; 1¼”, 1½” and 2” with the rings).

Standard Counter Plate

The counter plate assists forming of the outlet and improves the quality of the outlet by supporting the tee forming machine against the run tube. The counter plate is used for run tube sizes from NS 2 ½” (66.7 mm) to 4” (108 mm).

6’’ Retrofit kit

The 6’’ retrofit kit (168,3mm) comes as an option. It increases the capacity of the run tube up to 6’’. Kit includes special counter plate and support feet.

Lubrication for copper

A bottle of lubricant to be used for forming the outlet in copper tube, is included. Read the safety data sheet enclosed.

3.4 OPERATING RANGE OF THE MACHINE

The T-DRILL T-65 is intended for forming a tee in copper tube. The branch tube is joined to the run tube by brazing.

The outlet size range of T-65 is NS 1/2” to 2” (10 – 54 mm).

The diameter of the run tube can be 1/2 “ to 4” (15 - 108 mm). *With optional retrofit kit up to 6’’ (168,3mm) run tubes. The maximum wall thickness of the tube to be branched depends on the tube diameter and the size of the T-DRILL head used.

Accurate capacity values: diameters and wall thicknesses of the tube are specified in the capacity chart.

3.5 TECHNICAL SPECIFICATIONS

T-65	Value	Note!
Type code	3305	
Tee diameter	NS 1/2” - 2” / 10– 54mm	
Run tube	NS 1/2” - 4” / 15– 108mm	Up to 6” / 168,3 mm with optional retrofit kit
Max. wall-thickness	See Capacity chart	
Materials	Copper (Cu)	
Cycle	1 min 45 sec	
Rotation speed of spindle	T-65: 500 / 50 RPM T-65B: 400 / 40 RPM	
A-accentuated equivalent level of sound pressure	82,5 dB (A)	Use ear protectors!
Vibration	less than 2,5 m/s²	
Dimensions of the unit	22.4”(l) x 4.9” (h) x 7.1” (d) 570 (l) x 125 (h) x 180 (d) mm	
Weight of the unit	T-65: 11,9 lbs /5,4 kg T-65B: 14 lbs / 6,35 kg	
Supply voltage of the unit	120 V / 60 Hz / 7,0 A 230 V / 50 Hz / 4,0 A 110 V /50 Hz / 8,4 A T-65B: 28 VDC	

4. TRANSPORT, HANDLING AND STORAGE

The T-65 / T-65B machine is delivered in a transport box, dimensions 640mm (25.2”) x 165mm (6.5”) x 360mm (14.2”) (w x h x d). The weight of the box is, depending on the accessories, between 13 to 23 kg (29 - 49 lbs).

Storage
Keep the T-65 stored in a cool, dry place, covered against dust etc.

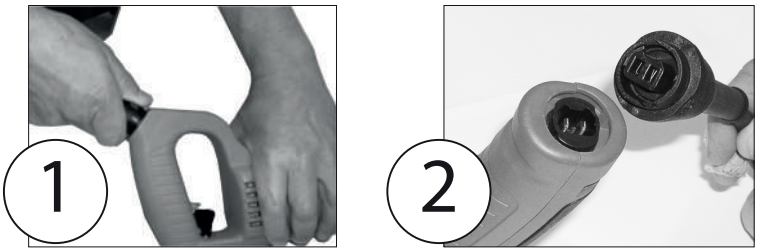
5. PREPARING BEFORE USE

↯ DANGER! Before using, make sure that the supply voltage agrees with the rated voltage specified on the tool.

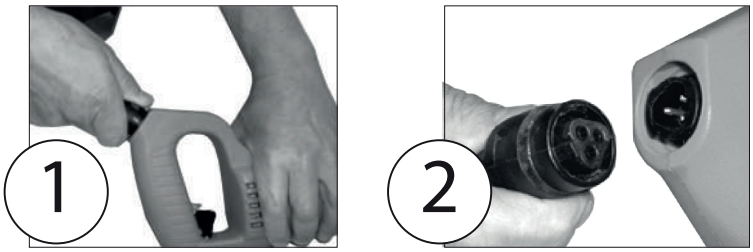
➡NOTE! Before pulling any collar always make sure that the pipe is completely empty.

5.1 DETACHMENT AND ATTACHMENT OF THE CONNECTING CORD

When delivered the T-65 power unit is fitted with a quick disconnect connecting cord, which allows quick replacement of the cord in field conditions.



The European type of connecting cord.



The American type of connecting cord.

Detachment of the cord

1. Turn the nut of the cord 1/2 circle to the left in order to loosen the cord.
2. Draw the cord out of the power unit.

Attachment of the cord

1. Push the connector of the cord into the socket of the power unit, pushing the connector as far as it will go.
2. In order to lock the cord, turn the nut 1/2 circle to the right.

5.2 START-UP CHECK FOR T-65

➡**NOTE! Carry out the start-up checks before using the machine.**

Before using the machine, proceed as follows:

1. Check that the cord is connected to the machine
2. Check that the cord is connected to the mains.

5.3 START-UP CHECK FOR T-65B

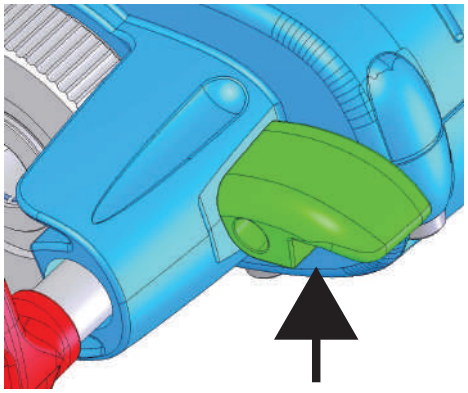
➡**NOTE! Before using the machine check that the battery is fully charged and accurately installed to the machine.**

6. THE OPERATION OF THE MACHINE

6.1 DESCRIPTION OF THE CONTROL DEVICES

Control devices: 1. Trigger, 2. Speed selector 3. Feed mechanism engagement lever

➡**NOTE! When working press the trigger completely down!**



The speed selector *The feed mechanism lever*

1. The speed selector knob is on the top of the gearbox of the tee forming unit. To engage high or slow speed, turn the selector knob 180°. The selected speed as shown in the picture. Slow speed I is used for forming of the tee and trimming. High speed II is for drilling. If the torsional force of the machine is not sufficient, then turn the speed selector to speed I. If the feed does not engage smoothly rotate the motor by “pumping” the trigger.

Use maximum speed of rotation when drilling and forming the outlet.

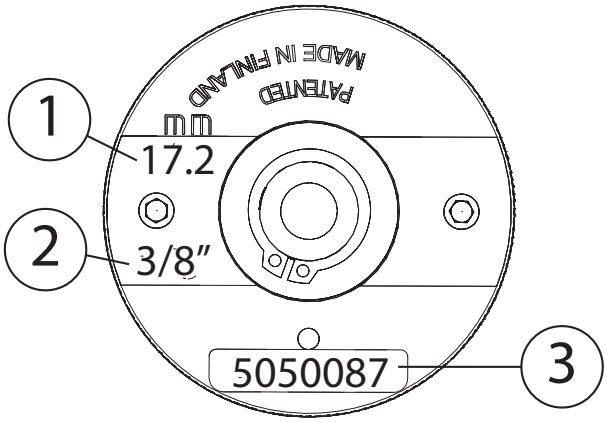
2. The feed mechanism lever is situated near the chuck-ring. The feed mechanism has been engaged (on) when the lever is turned downward, i.e. as shown on the illustration. If the feed does not engage smoothly rotate the motor by “pumping” the trigger.

➡**NOTE! Do not force lever.**

6.2 SELECTION AND ADJUSTMENT OF THE T-DRILL HEADS

6.2.1 THE IDENTIFICATION OF THE T-DRILL HEAD

The size of the T-DRILL head is stamped on the cover plate:



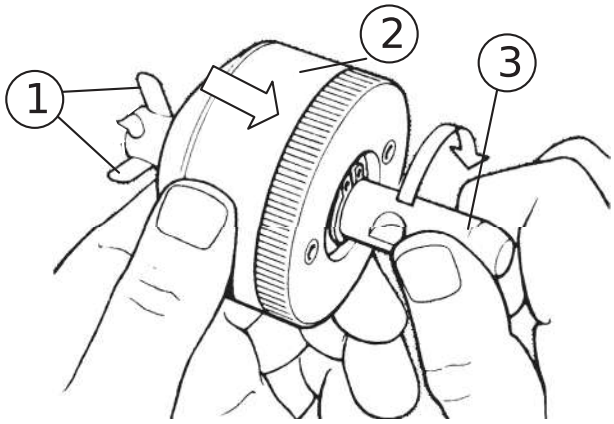
Identification: 1. Actual size in millimetres, 2. Nominal size in inches (NS),

3. The ordering and identification number of the T-DRILL head

6.2.2 THE FINE ADJUSTMENT OF THE OUTLET DIAMETER

➡NOTE! When adjusting the outlet diameter, extend the forming pins first.

Each T-DRILL head is adjusted at the factory to correspond to the nominal size stamped on the cover of each T-DRILL head. Changing the tube sizes may require adjustment of the T-DRILL head.

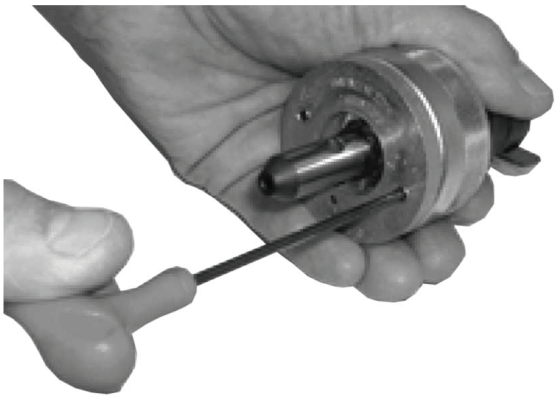


To extend the forming pins (1) press the cover (2) in direction of the shank. Twist the shank (3) at the same time clockwise until a positive stop is reached, and the forming pins extend.

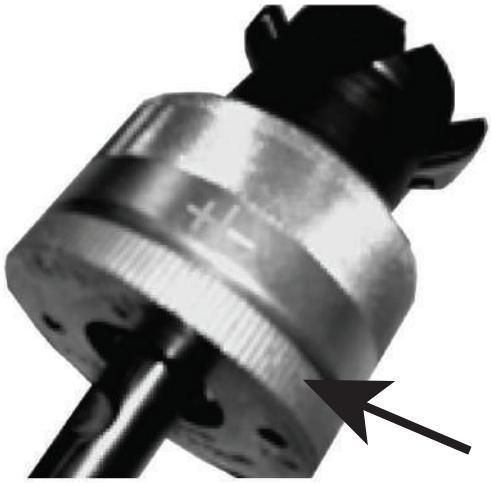
Check the forming pin span diameter "T" with an adjusting ring or slide gauge.

Depending on the size of the T-DRILL head, the forming pin span T should be 0.020" – 0.055" (0,5 - 1,4mm) bigger than the branch pipe outer diameter (O.D.)

6.2.3 CHANGING THE OUTLET SIZE



1. Loosen the screws on the cover plate by about one circle using a 3 mm hexagon wrench that is supplied with the T-DRILL package.



2. To enlarge the outlet rotate the conical cover with respect to the cover plate in plus (+) direction. Hold the cover plate stationary. To make a smaller outlet rotate the conical cover in minus (–) direction while holding the cover plate stationary.
One notch on the cover-plate equals to 0.01” or 0,25 mm on the forming pin span.

3. Tighten the two screws on the cover plate and check the adjustment either by measurement across the pins or by forming a trial outlet.

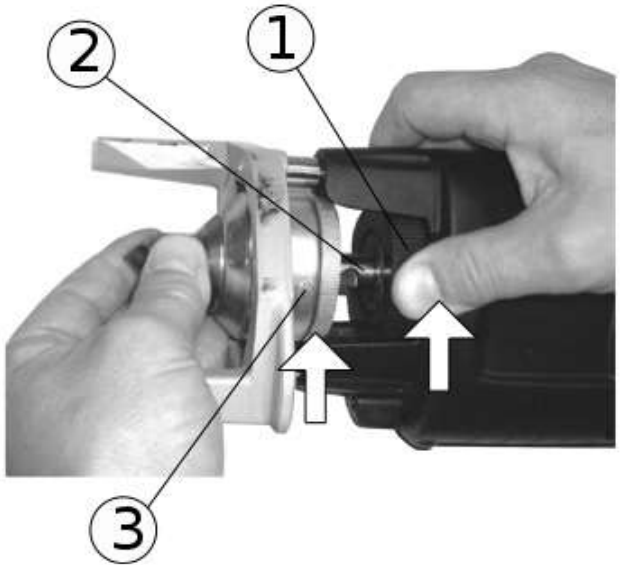
6.3 CHUCKING THE T-DRILL HEAD

6.3.1 CHUCKING

To insert the T-DRILL head into the chuck, rotate the locking ring (1) clockwise and slide the T-DRILL head shaft into the chuck. Release the locking ring. Rotate the T-DRILL head (2) in the chuck until it locks. Make sure the T-DRILL head is tightly chucked.

6.3.2 REMOVAL

To remove the T-DRILL head (2) from the chuck (1), rotate the locking ring as far it will go. Turn the T-DRILL head to the same direction one quarter of a turn (1/4) at the same time pulling it straight out. Release the lock ring.



Chucking the T-DRILL head and removing it.

6.4 THE TEE FORMING PROCESS WITH THE T-DRILL T-65

Since the process may be new to you, we recommend that you read the following instructions carefully and then practice a few times on some pieces of scrap tubing.

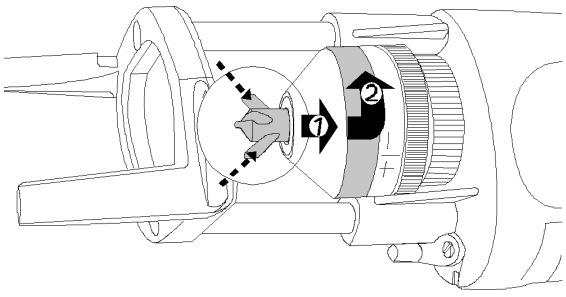
➡NOTE! Before forming any tee always make sure that the pipe is completely drained and that it is not under pressure

1. Select the correct T-DRILL head.

2. Check the forming pin span (T). Adjust if necessary. (See chapter 6.2.2).

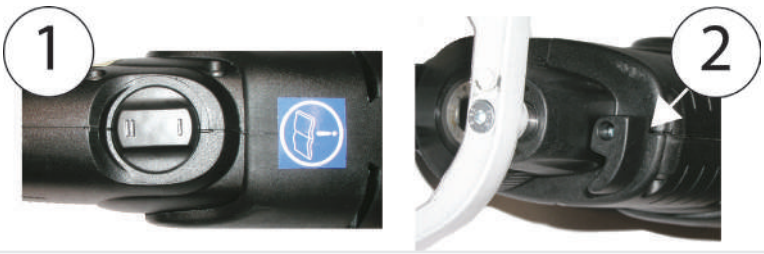
3. Chuck the T-DRILL head.

4. Lubricate the T-DRILL head before every tee forming operation! Extend the forming pins and lubricate them as well as the cutting edges of the T-DRILL head as illustrated. Always use T-DRILL lubricant.

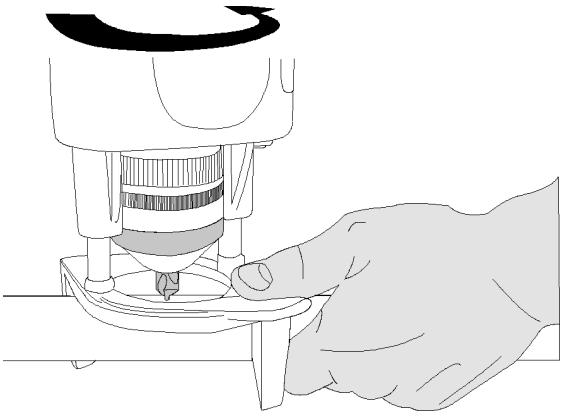


5. Retract forming pins. Press the conical cover towards the tool and rotate it clockwise to retract the forming pins.

6. Check that the speed selector knob is in position II and the feed mechanism lever in “off”-position.



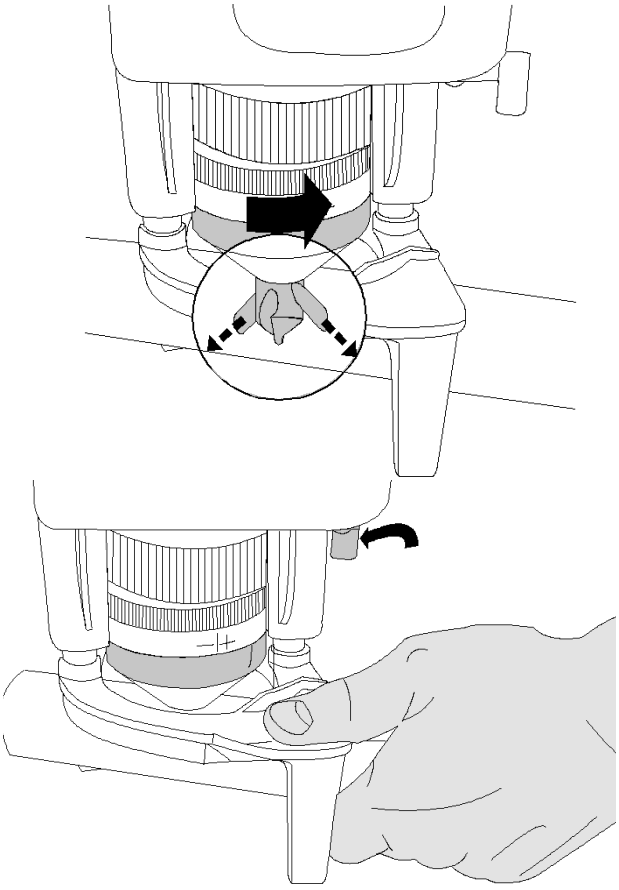
T-65 control devices: 1. Speed selector 2. Feed mechanism lever in off-position



7. Pull the support legs out and place the tube support firmly onto the point where the tee is to be formed on the tube, as shown on the illustration. Press the tube support with the thumb against the tube and twist the machine counterclockwise at the handle of the tool. This centers the T-DRILL head onto the tube.

8. Start the tool by pressing the trigger and drill until the bit has fully penetrated into the tube. Release the trigger - the machine will stop.

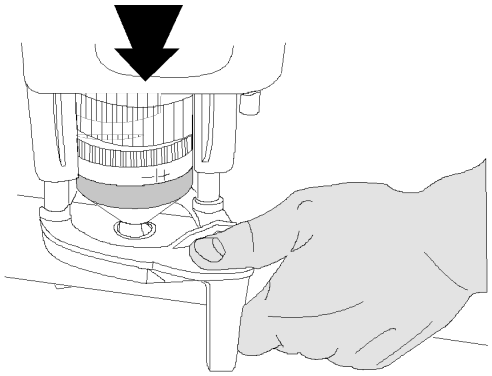
➡NOTE! If the tool does not have enough power to drill – select the low speed I and continue drilling. This may be necessary if a long extension cord is used.



9. Extend the forming pins on the T-DRILL head by pressing the conical cover towards the tool and rotating it counterclockwise until the T-DRILL head locks into the tee forming position.

Do not extend the forming pins while the motor is running!

10. Select low speed I by turning the selector knob. (Always use low speed (I) when forming the outlet, consult capacity chart in section 11.1 for options.) Engage the feed mechanism as shown. If it does not engage smoothly, rotate the motor by “pumping” the trigger.



11. Start forming the outlet by pulling the trigger and continue until the T-DRILL head is completely out of the tube. During the forming of the tee, keep the tube support against the tube and push the tool toward the tube. This insures that you obtain a circular outlet.

12. Once the T-DRILL head has come completely out of the outlet, release the trigger.

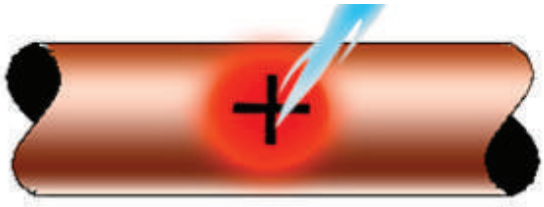
IMPORTANT! Release the drill trigger as soon as the T-DRILL head clears the rim of the outlet.

➡NOTE! Never attempt to "help" the tool by pulling it out of the tube. This would result in an oval outlet!

➡NOTE! Wipe away any excess lubricant which may have remained inside the outlet before brazing. Use sand cloth or Scotchbrite to clean the inside of the rim of the outlet!

6.5 ANNEALING OF TUBE

ⓘ DANGER! The annealed work piece is extremely hot after annealing. When working with the tube protective gloves should be used.

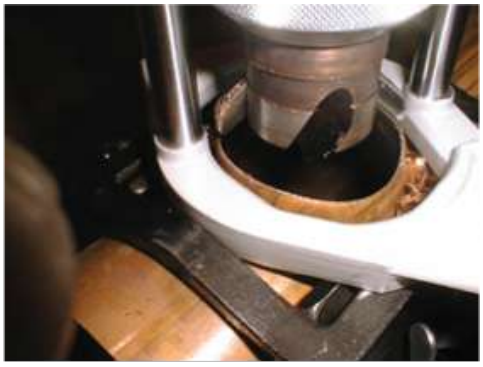


1. Anneal the area where outlet is to be formed to a dull red. The area will remain annealed even when cool. It is not necessary to form the outlet on hot tube!

2. Attach counterplate to the tube where annealing has been done.

3. Lubricate forming pins and cutting edges on T-DRILL head.

4. Retract forming pins on T-DRILL Head and attach T-DRILL T-65 to counterplate. Notches on tube support fit on tabs of counterplate.



5. Drill pilot hole, extend forming pins, reduce speed, engage feed mechanism, pull trigger to form the outlet. Release trigger when forming pins clear the rim of the outlet.

6. Notch and dimple both sides of branch tube.

7. Align dimples with the run of the tube after insertion into the outlet. Braze the joint.

6.6 FORMING A TEE TO RUN TUBES > 4”

1. Install optional retrofit kit #5540120 support feet.
   - When making an outlet larger that 1” continue from section 6.5.
   - When making an outlet ½” or ¾” (to bigger that 4” run tube), continue:

2. Use the retrofit kit counter plate.

3. Drill pilot hole.

4. Remove T-65 from counter plate, but leave counter plate on tube.

5. Anneal pilot hole area to dull red about 1400F (760°C).

6. Deburr the inside of of pilot hole to make way for the forming pins to extend.

7. Continue from chapter 6.5 step 3.

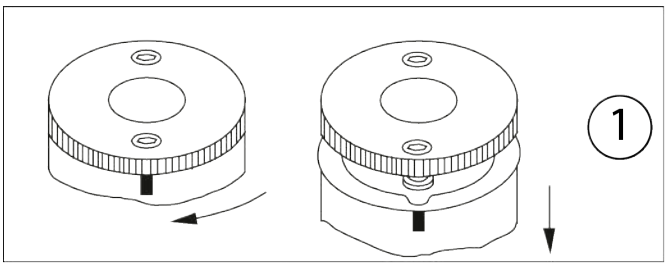
7. MAINTENANCE

7.1 THE MAINTENANCE OF THE T-DRILL T-65

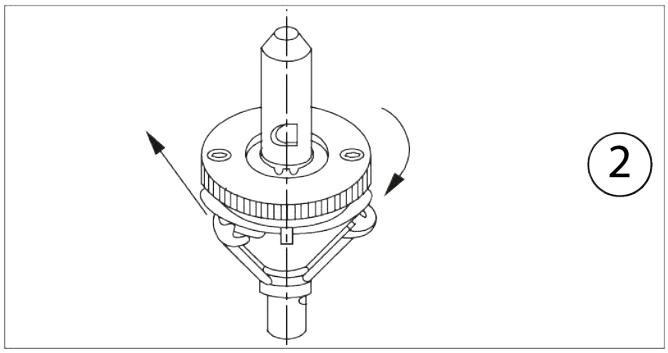
Clean dust and dirt from machine surface and power unit vents periodically.

The T-DRILL T-65 is prelubricated and does not need special attention for maintenance.

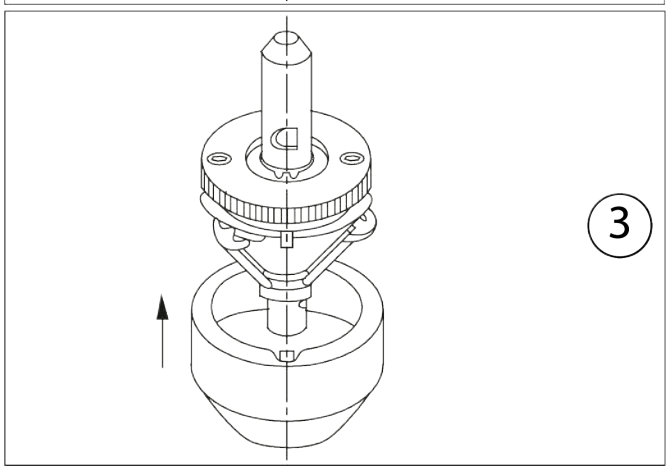
7.2 THE POLISHING AND REPLACEMENT OF THE FORMING PINS



1. Loosen the two screws on the cover plate one turn and rotate the conical cover relative to the cover plate so that the conical cover can be removed.



2. When the conical cover is removed rotate the cone so that the forming pins can be slided from the shank.
The forming pins can now be polished with a felt polishing wheel.



3. Reassemble the collaring head using new or polished forming pins and adjust the correct collaring diameter.
Check the alignment when assembling.

8. TROUBLE-SHOOTING

Problem	Cause	Remedy
The feed does not engage.	The threading of the screw and the nut are in the wrong position to match each other.	Start the motor by pulling the trigger a couple of times with pumping movements, at the same time turning the gear lever.
The power unit doesn't run.	The connection cord loose, or the plugs do not make contact with the wires inside the cord.	Insert the cord into the bracket, or substitute the cord with a new one.
	Trigger not fully pressed.	Press the trigger fully.
Burrs in the tee that has been formed	Burrs in the pilot hole: • The drill bit is dull • Lubricant insufficient • Lubricant of bad quality	• Anneal Area to be drilled • Change drill bit • Use more lubricant • Only lubricant recommended by T-DRILL is to be used
	The forming pins are worn or dirt stuck on their surface.	Clean or change the forming pins.
	Insufficient lubricant during forming of the outlet.	Always lubricate the T-Drill head carefully before every outlet forming operation.
	Lubricant not suitable to the material	Consult your local T-DRILL representative
	The wall thickness of the tube exceeds the maximum allowable thickness.	Consult the capacity charts
The size of the tee varies.	Dirt stuck to the surface or the holes of the forming pins.	Clean the forming pins.
	Adjusting screws of the head are too loose.	Tighten the screws.

Problem	Cause	Remedy
The forming pins or the drill shank breaks.	Lack of annealing when called for in instructions.	See instructions. Anneal tube properly before collaring if required.
	Burrs in the pilot hole -drill bit dull.	Resharpen or change the drill bit.
	The wall-thickness of the tube exceeds the max. allowable thickness.	See the 10. Capacity charts.
	Not enough lubricant during forming of the tee.	Lubricate the T-Drill head carefully before forming the outlet.
	The lubricant is not suitable for your material.	Consult your local T-DRILL representative.
	Slow speed was not used when referenced on the capacity chart.	Use slow speed when indicated on the capacity chart.
	Tool is not straight against the pipe.	Use counterplate. (extra equipment).

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
- e-mail –address

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

- The serial number of the machine
- Type code
- Short description of the appeared problem

9. DISPOSAL OF THE T-DRILL MACHINE

In the manufacturing of the T-DRILL machines various kinds of metals, plastic and lubricants have been used. Dispose of your T-DRILL machine according to federal, state and local regulations.

10. WARRANTY

T-DRILL guarantees that every T-DRILL T-65 tee forming machine is free from defects in materials and workmanship (other than normal wear and tear) for a period of one (1) year from date of shipment. Should within this period any T-65 be proved to T-DRILL's satisfaction to be defective, such product shall be repaired or replaced. Such repair or replacement shall be T-DRILL's sole obligation; whereas the buyer's only obligation is to inform T-DRILL of any such defect. T-DRILL must receive the reclamation in writing within 10 days after a defect having been noticed and, at

T-DRILL's option, buyer will have to return the complete tool to the nearest T-DRILL Representative or Distribution Center. THIS WARRANTY IS PRIMARY.

T-DRILL's warranty shall be limited to the aforesaid warranty 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.

Please register your purchase by filling out and returning the warranty registration card enclosed. Save your receipt.

11. SUPPLEMENT

11.1 CAPACITY CHART IN MILLIMETERS AND INCHES

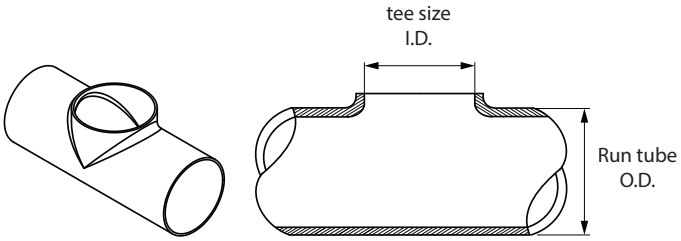
Use the capacity charts to determine the maximum wall-thickness of the tube and to select the right T-DRILL head.

Instructions for the use of the capacity charts:

1. Use the unit of measure that is correct for you: the measures of the charts are in both millimeters and in inches.

2. From the horizontal black row, find the tee size you need (inner diameter), and from the vertical black column the outer diameter of your run tube.

3. The intersection of the horizontal and vertical rows will show you the maximum wall-thickness of the tube. This thickness is not to be exceeded.



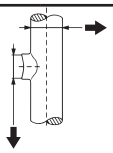
Capacity charts for forming tees in copper tubes

Max wall-thicknesses (mm and inch)

		8	10	12	15	18	22	28	35	42	54
		5/16”	3/8”	1/2"	5/8"	3/4"	7/8"	1 1/8"	1 3/8"	1 5/8"	2 1/8"
15	5/8"	0.8	1.0	1.2	1.2						
18	3/4"	0.8	1.0	1.2	1.5	1.2					
22	7/8"	0.8	1.0	1.2	1.5	1.5	1.5				
28	1 1/8"	0.8	1.0	1.2	1.5	1.5	1.5	1.5			
35	1 3/8"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	1.5		
42	1 5/8"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	2.0	2.0	
54	2 1/8"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	2.0	2.0	2.0
64	2½"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	2.5	2.5	2.5
76,1	3"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	2.5	2.5	2.5
88,9	3½"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	2.5	2.5	2.5
108	4¼"	0.8	1.0	1.2	1.5	1.5	1.5	1.5	2.5	2.5	2.5

= Annealing before forming the tee is recommended!

11.2. CAPACITY AND INSTRUCTION CHART

		Run tube Ø								
		15 mm	22 mm	28 mm	35 mm	42 mm	54 mm	64 mm	76,1 mm	108 mm
Collar size (tee size)	15 mm	A-H	H	H	H	H	H	A-D-H	A-C-D-L	A-C-D-L
	22 mm		A-H	H	H	H	H	A-D-H	A-C-D-L	A-C-D-L
	28 mm			A-H	H	H	H	A-H	A-C-L	A-C-L
	35 mm				A-H	H	H	A-H	A-C-L	A-C-L
	42 mm					A-L	L	A-L	A-C-L	A-C-L
	54 mm						A-L	A-L	A-C-L	A-C-L

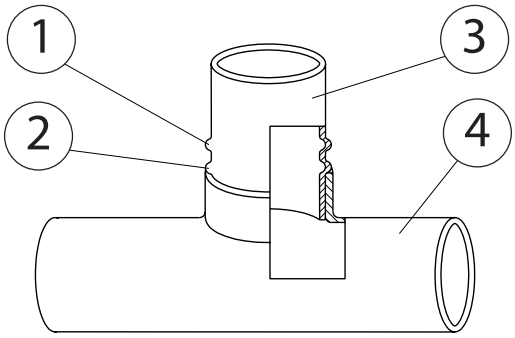
- A = Anneal outlet area to dull red about 760ºC.
- C = Use counter plate with T-65.
- D = Deburr pilot hole to make way for pins to extend.
- H = High speed tee forming is allowed.
- L = T-65 requires low speed tee forming

12. NOTCHER ND-54

12.1 GENERAL

12.1.1 PURPOSE OF THE TOOL

The tube end notcher is a device for the preparation of the end of the tube before insertion into the T-branch collar. It cuts a curved notch and produces two dimples simultaneously, one 6mm (1/4”) atop the other. When these dimples are placed in line with the run of the tube, one acts as a depth stop and the other as a point of inspection.



1. Point of inspection, 2. Depth stop, 3. Branch tube, 4. Run tube

12.1.2 OPERATING RANGE

mm	Inches
12	½
14-16	5/8
18	¾
22	7/8
28	1 1/8
35	1 3/8
42	1 5/8
54	2 1/8

12.1.3 DIMENSIONS

Measure	mm	in
Length	410	16,5
Operational width	160	6,5
Height, lever in upright position	500	20
Height, lever in down position	175	7
Weight	6,8 kg	15 lbs

12.1.4 DESCRIPTION OF PARTS

See chapter 14.4

12.2 OPERATION INSTRUCTIONS

Lay the notcher on an even surface. Line up the appropriate die with the base by rotating the body plate. The appropriate die size should face away from the base for maximum leverage. Insert the tube into proper die. Push the lever all the way down to ensure that the notch and dimple are properly formed. Release the lever. Turn the tube 180° so that the dimples that have been formed line up with the two set screws in the holder pin. Push the lever again. Release. If the tube is already brazed with one end to the pipework, operate the notcher like pliers by using the lever and base as handles.

12.3 MAINTENANCE

12.3.1 LOOSE HOLDER PINS

In case holder pins are loose, unscrew both screws on the name plate, lift up name plate and tighten the set screw for the holder pin with a 3 mm hex wrench.

12.3.2 DIMPLE /DEPTH STOP ARE TOO SHALLOW

The notcher tips in the holder pins are preadjusted at the factory to provide dimple / depth stop of the proper depth.

In the dimples become too shallow the reason can be loose holder pins. Check and tighten (point 12.3.1). If this doesn’t help, put lever in the down position, turn notcher on its side and tighten the 19 mm nut under the base plate until it is firmly screwed down.

The indicator that the nut is properly tightened is that the lever stays in the down position when it is picked up and has to be physically brought to the up position.

12.3.3 ADJUSTMENT OF NOTCHER TIPS

In case notcher tips need fine adjustment do the following:

Heat holder pin with a flame until tips can be turned with 2 mm wrench to the proper depth. Heating is necessary because of glue on tip's screw.

12.3.4 HOW TO REPLACE LOWER DIE

Remove the 19 mm nut under the base as follows:

Put lever in down position. Turn notcher on it's side and loosen the nut.

Noe you can remove screw rod, upper and lower die assemblies, spring and base from each other.

Lower die has been tightened on the body plate with the help of 4 pieces of 6 mm screws. Loosen with a 6mm hex wrench and remove.

12.3.5 HOW TO REPLACE UPPER DIE

Remove upper die assembly as above (point 12.3.4). To remove name plate, unscrew the two screws and lift off name plate. Secure tube shaft to vise. Only loosen lock screws of holder pins with 3 mm wrench and remove lock screw of 54 mm (2") holder pin (this will help to position upper die to the right spot when assembling).

Remove all holder pins. Loosen lock nut on the top and remove that + washer with the help of hook key. 45 - 50 mm hook key is required or loosen with screw driver and mallet. Remove two pins in the assembly by hammering them trough the holes with center punch. Remove holder pin plate and replace upper die. Assembly may be done as follows: Assemble upper die and holder pin plate on support plate for upper die so that holes Ø 6 mm are on the same line. Upper dies position must be such that the two smallest dies are on the left of 54 mm (2") dies.

Hammer the pins Ø 6 mm (2 pcs) into the holes.

Assemble the washer and lock nut and tighten. Assemble the holder pins and tighten the lock screw of those. There are similar holder pins 28 - 54 mm (1", 1¼", 1½", 2")* and four different from 12 mm (3/8") up to 22 mm (¾"). **

Insert appropriate holder pins and tighten the nut 19mm as instructed in part 12.3.2.

* the 54 mm (2") pin has the notcher tips that are extended the most

** 22 mm (¾") holder pin has a slight bevel at the end

18 mm (5/8") holder pin has a slight bevel at the end and a thinner profile

15 mm (½") holder pin also has a slight bevel plus an even thinner profile

12 mm (3/8") holder pin has the bevel plus a half round profile

13. ORDERING SPARE PARTS

When ordering spare parts, please state the following details:

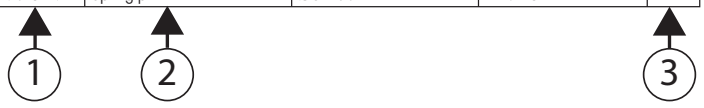
- Type code of the machine
- Manufacturing code of the machine
- The part number
- A description of the part
- The quantity of the parts required

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

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14. SPARE PARTS LIST

14.1 T-65 PIPE COLLARING MACHINE FOR COPPER

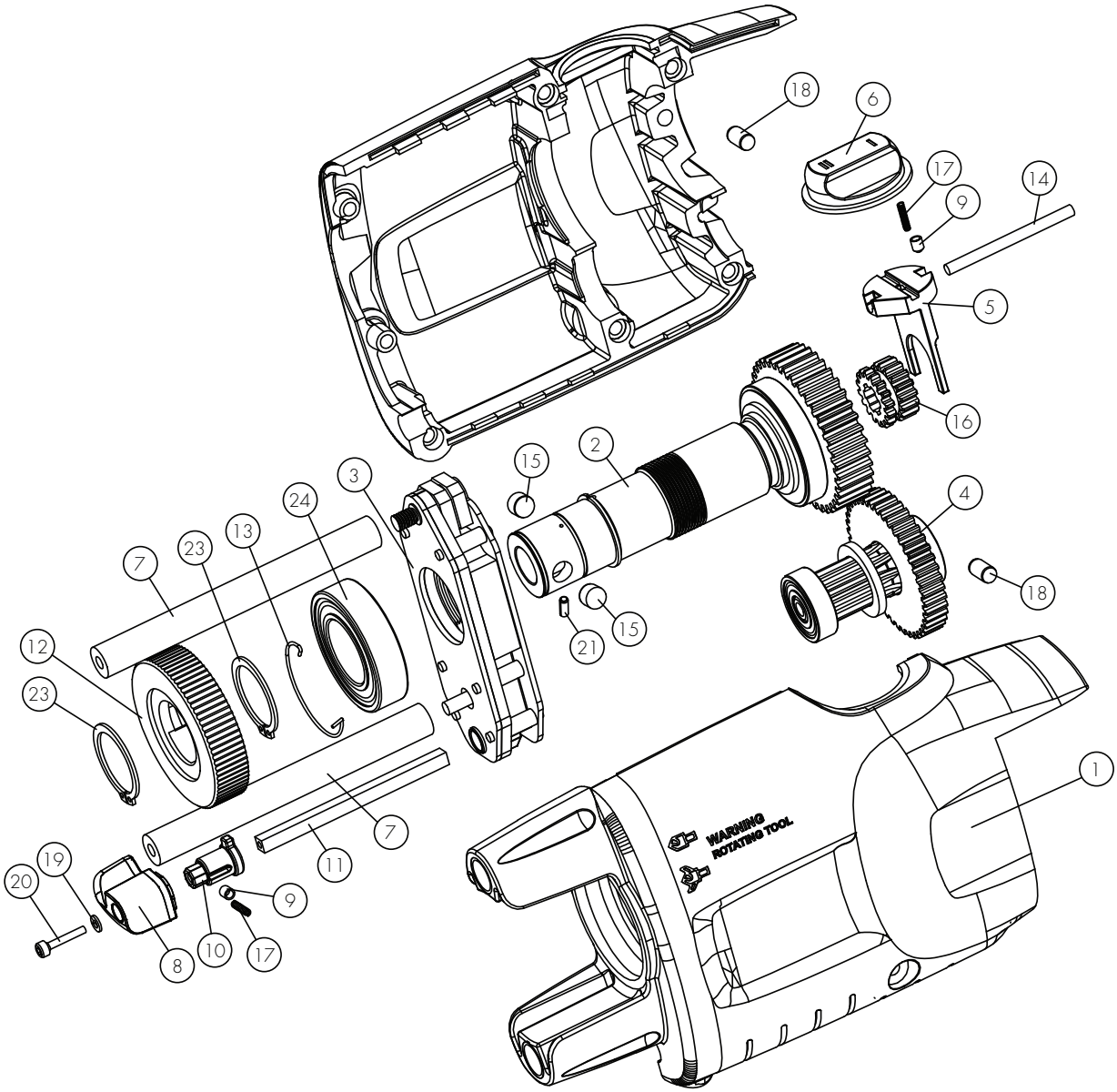
Part No.	Complete assembly
5330678	T-DRILL T-65 120 V USA
5330682	T-DRILL T-65 230 V Europe
5330688	T-DRILL T-65B

Pos	Part No.	Description	Size/type	Qty
	5330158 5330160 5330691	Power Unit 120 V USA Power Unit 230 V Europe Power Unit T-65B		1
2	5330154	T-65 Tee Forming Unit		1
3	6330680	Adapter PUR		1
4	3330032	Tube Support		1
5	9114027	Socket head cap screw		2
6	6330674 6330673 6330687	Name plate 120 V USA Name plate 230 V Europe Name plate T-65B		1
7	9146622	Sticker, read the instr.		1
8	9048335 9048320	Cord 120 V USA Cord 230 V Europe	T-65 only	1
9	8001898	Charger	T-65B only	1
10	8001897	Battery	T-65B only	1

14.2 THE T-65 TEE FORMING UNIT 5330154

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	5330156	Housing	T-65		1
2	5330117	Lead Screw			1
3	5330097	Nut assembly			1
4	5540031	Gear			1
5	3330178	Gear changer			1
6	5330115	Shift Knob			1
7	4330099	Push rod			2
8	3330074	Lever			1
9	4540068	Tip			2
10	3330075	Fastening bush			1
11	4540056	Bar			1
12	3300056	Chuck ring			1
13	4300055	Chuck spring			1
14	4540069	Shaft			1
15	4300054	Chuck pin			2
16	3540045	Selector gear			1
17	9026146	Pressure spring	Ø0.4/Ø2.0x10,6 SS2387	Lesjöfors Springs	2
18	9018089	Parallel pin	Ø6m6x12	DIN 6325	2
19	9012205	Wave washer	Ø3.2x6x0,4 DIN 137 A	DIN 137	1
20	9017033	Slot-head screw	M3x16 5.8 Zn	DIN 7985	1
21	9018206	Spring pin	Ø3x8	DIN 1481	1
23	9019007	Retaining ring	Ø25x1.2	DIN 471 Bl1	2
24	9021006	Groove ball bearing	Ø25/Ø47x12 6005-2RS	DIN 625	1

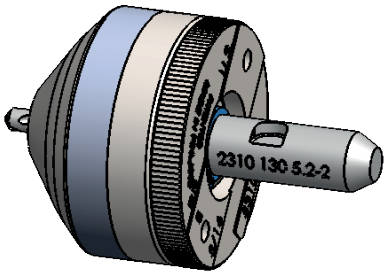
14.2 THE T-65 TEE FORMING UNIT



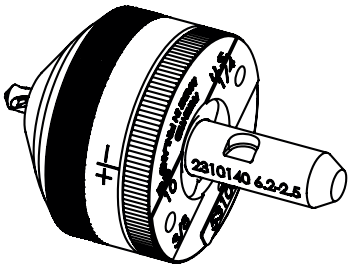
14.3 T-DRILL COLLARING HEADS

Tee Size Ø mm	8	10	12	15	18
Actual Tee Size Ø inch	5/16	3/8	½	5/8	¾
Order No.	5310408	5310399	5310400	5310401	5310402

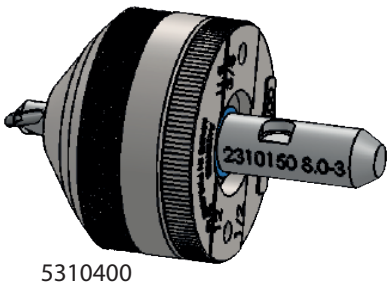
Tee Size Ø mm	22	28	35	42	54
Actual Tee Size Ø inch	7/8	1 1/8	1 3/8	1 1/2”	2”
Order No.	5310403	5310404	5310411	5310412	5310413



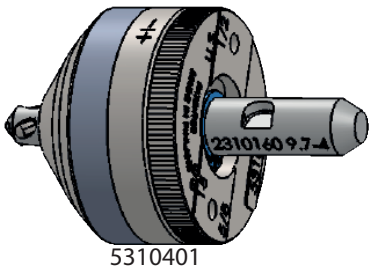
5310408 / 5310398



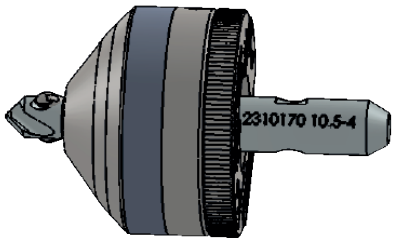
5310399



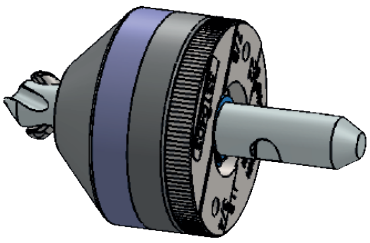
5310400



5310401



5310402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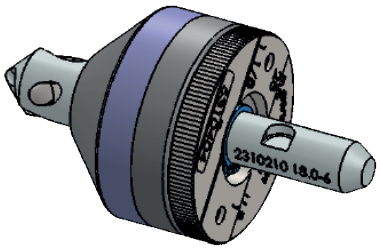
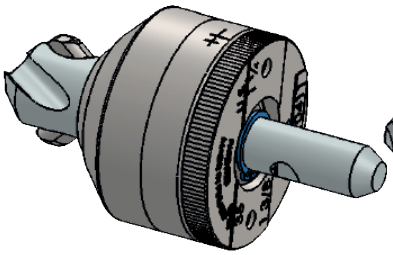
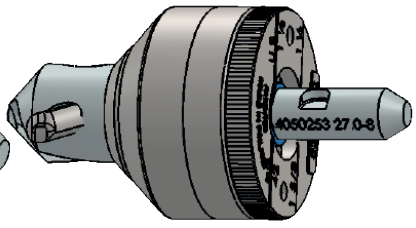
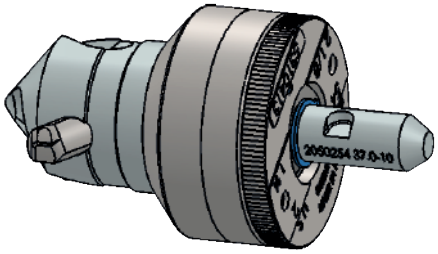


5310404


5310411



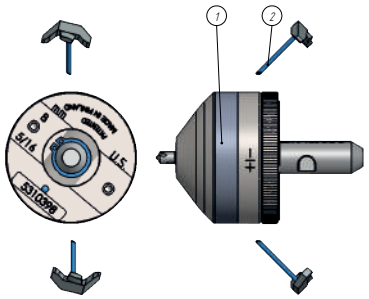
5310412



5310413

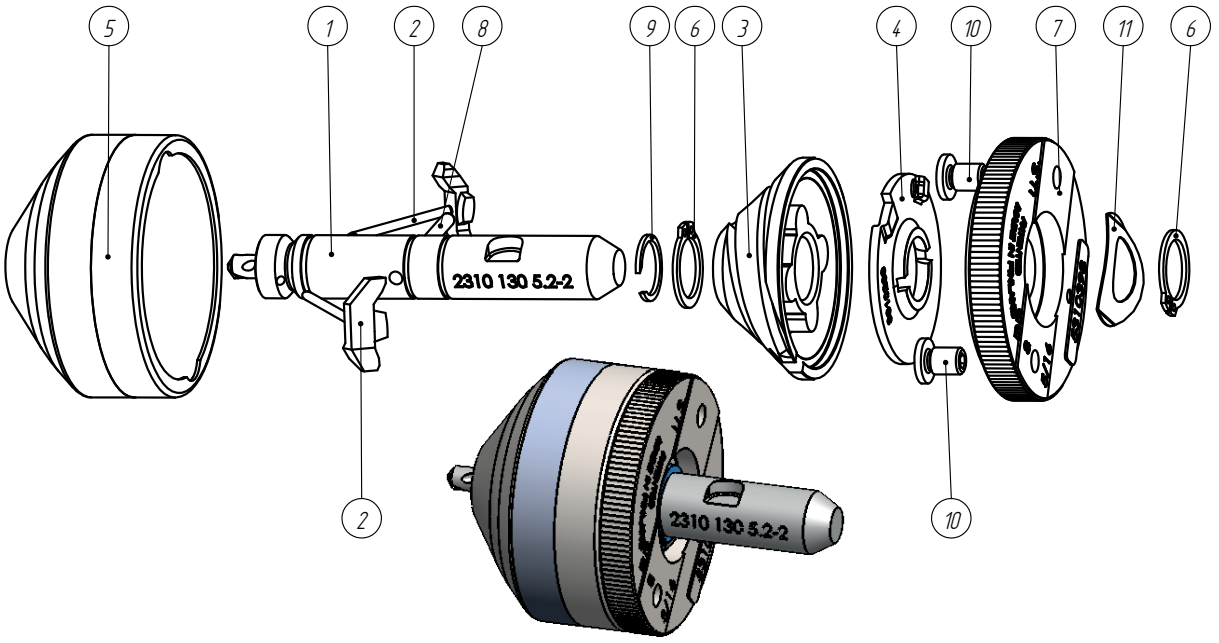
14.3.1 COLLARING HEAD Ø 8 (5/16”) AND PAIR OF PINS 5310408A

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	5310398	Collaring head	Ø8		1
2	3310235	Forming pin P2			2



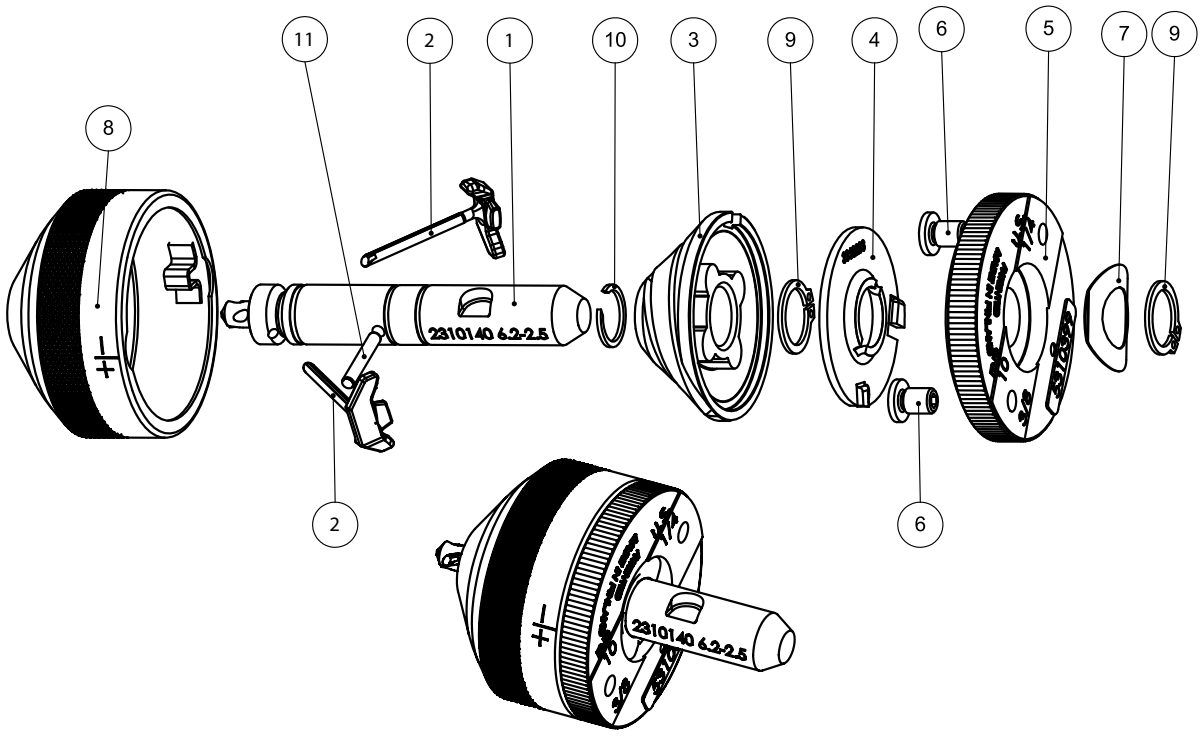
14.3.1.1 COLLARING HEAD Ø 8 (5/16”) 5310398

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310130	Drill core	5,2-2		1
2	3310235	Forming pin P2			2
3	2310283	Cone			1
4	3310289	Adjusting shim			1
5	3310380	Conical cover 14			1
6	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
7	4310317	Cover	Ø 8 (5310398)		1
8	9018038	Parallel pin	Ø3m6x20	DIN 6325	1
9	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
10	4310372	Screw			2
11	4310376	Spring			1



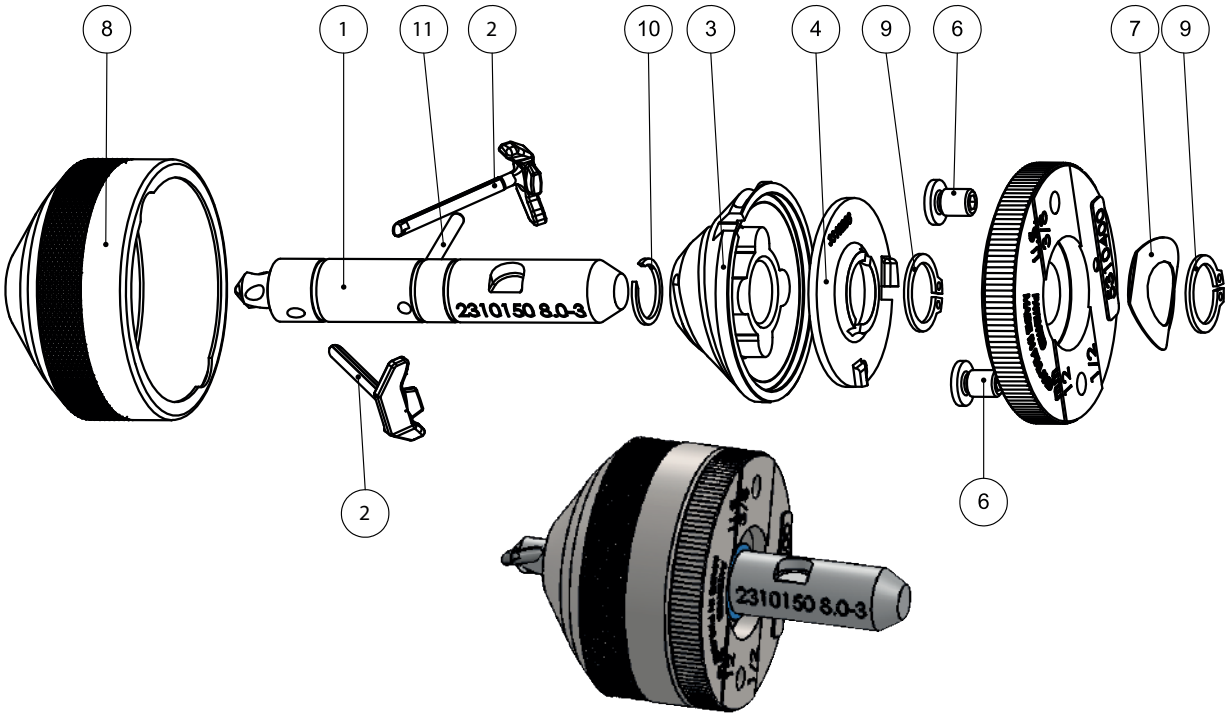
14.3.2 COLLARING HEAD Ø 10 MM (3/8”) 5310399 B

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310140	Drill core	6,2-2,5		1
2	3310468	Forming pin	Ø2.5		2
3	2310283	Cone			1
4	3310293	Adjusting shim			1
5	4310323	Cover	Ø10, 1/4"		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310380	Conical cover 14			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



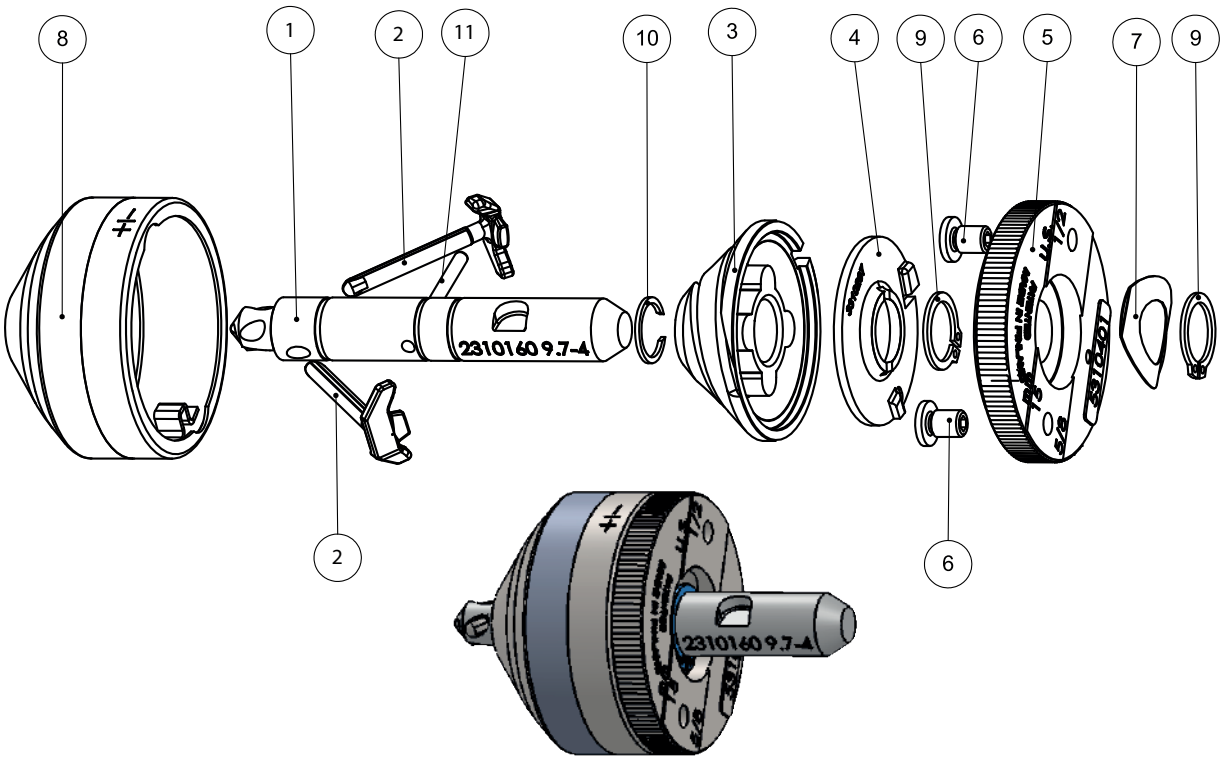
14.3.3 COLLARING HEAD Ø 12 MM (1/2”) 5310400 C

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310150	Drill core	8,0-3		1
2	3310469	Forming pin	Ø3		2
3	2310283	Cone			1
4	3310293	Adjusting shim			1
5	4310329	Cover	Ø12, 3/8" (5310400)		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310380	Conical cover 14			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



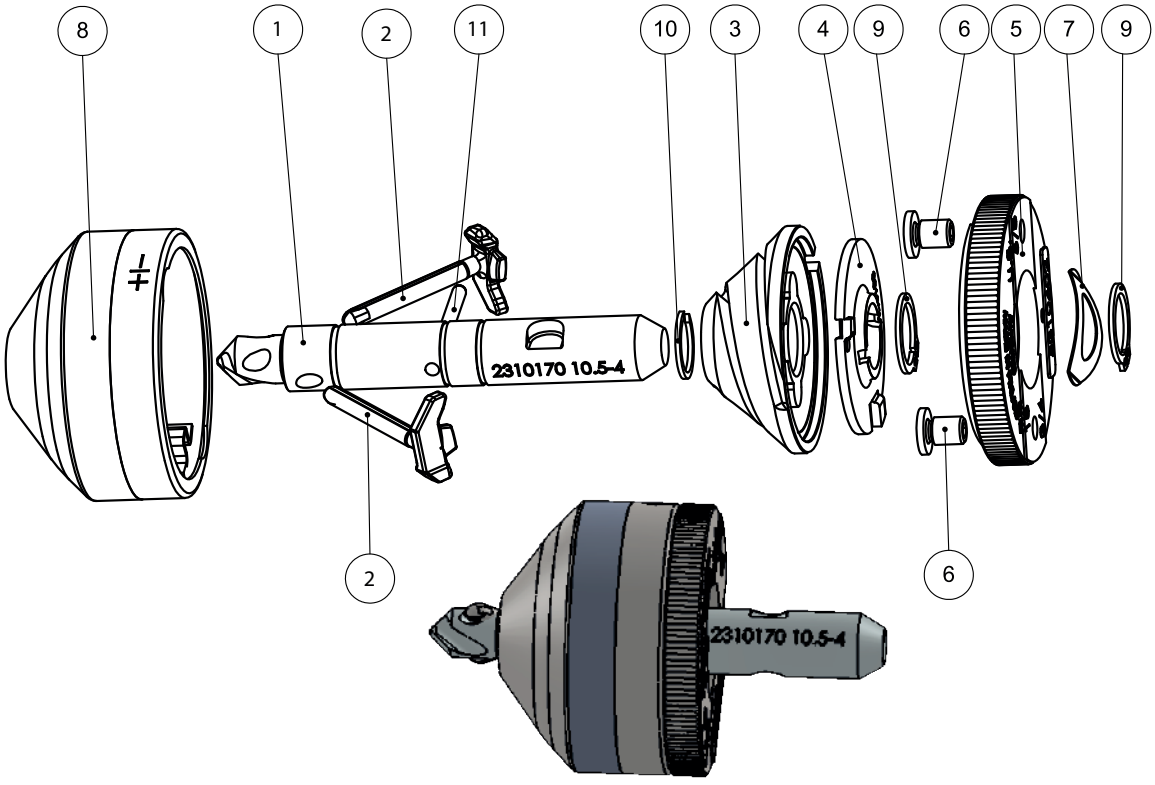
14.3.4 COLLARING HEAD Ø 15 MM (5/8”) 5310401

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310160	Drill core	9,7-4		1
2	6310551	Forming pin	CrN Ø4,0		2
3	2310283	Cone			1
4	3310297	Adjusting shim			1
5	4310335	Cover	Ø15, 1/2" (5310401)		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310380	Conical cover 14			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



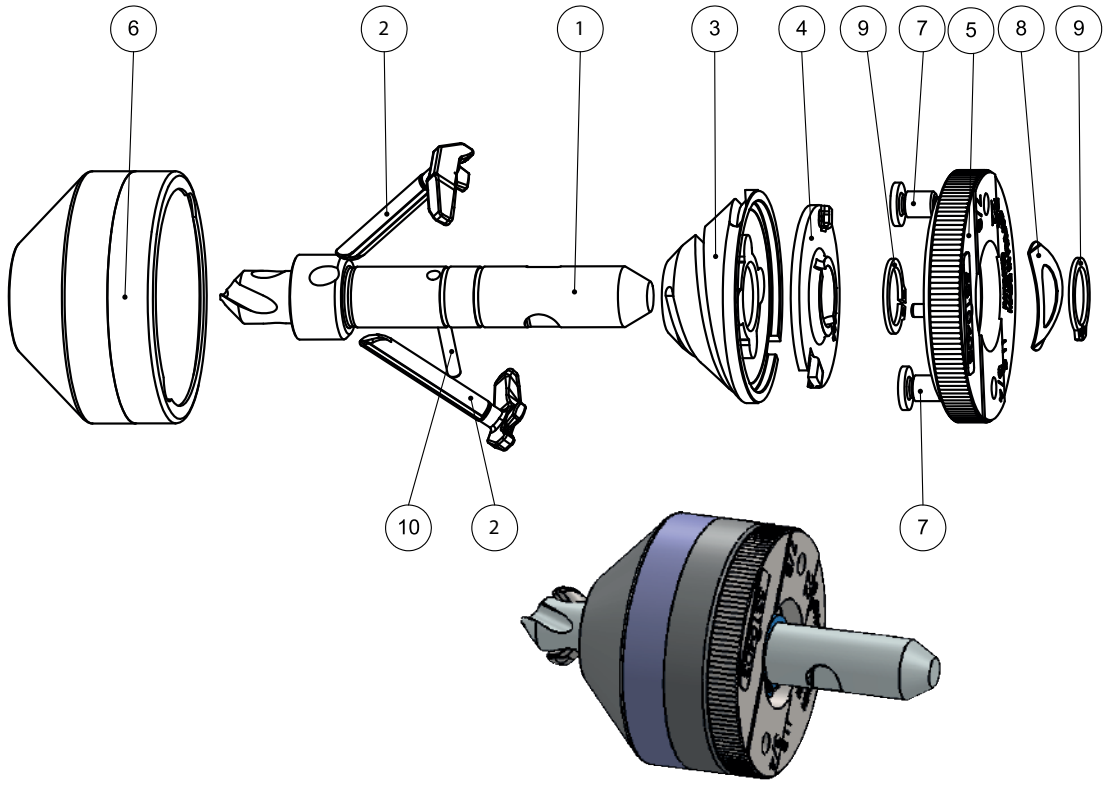
14.3.5 COLLARING HEAD Ø 18 MM (3/4”) 5310402 C

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310170	Drill core	10,5-4		1
2	6310551	Forming pin	CrN Ø4,0		2
3	2310283	Cone			1
4	3310310	Adjusting shim			1
5	4310341	Cover	Ø18, 5/8" (5310402)		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310380	Conical cover 14			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



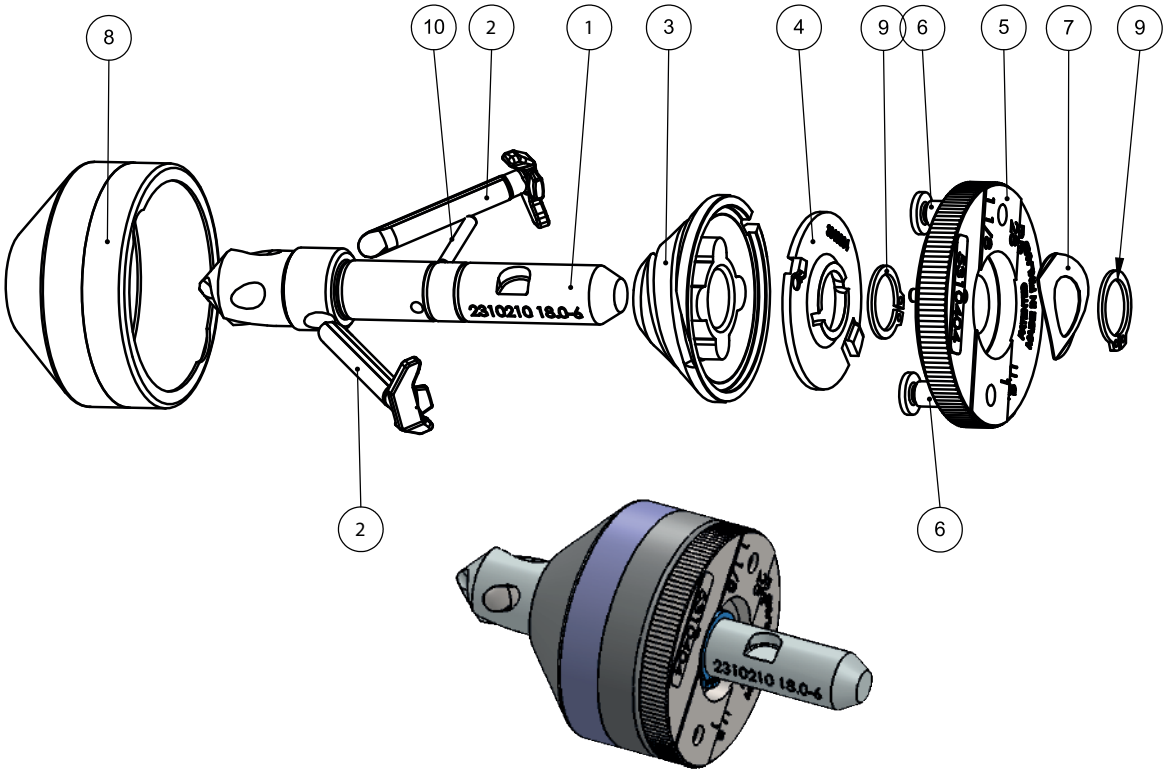
14.3.6 COLLARING HEAD Ø 22 MM (7/8”) 5310403 C

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310180	Drill core	12,2-5		1
2	4310473	Forming pin P5			2
3	2310283	Cone			1
4	3310304	Adjusting shim			1
5	4310347	Cover	Ø22 (5310403)		1
6	3310389	Conical cover 20			1
7	4310372	Screw			2
8	4310376	Spring			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



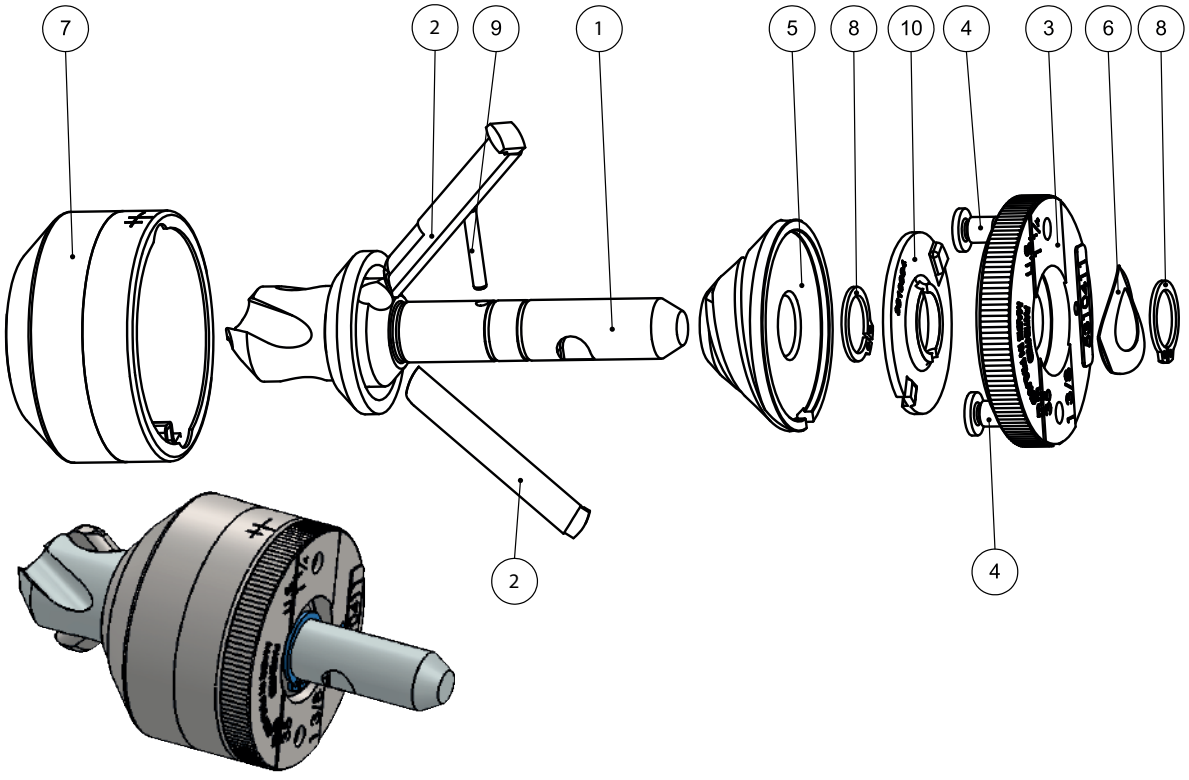
14.3.7 COLLARING HEAD Ø 28 MM (1 1/8”) 5310404 D

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310210	Drill core	18,0-6		1
2	4310474	Forming pin	CrN pinnoite		2
3	2310283	Cone			1
4	3310304	Adjusting shim			1
5	4310359	Cover	Ø28, 1" (5310404)		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310389	Conical cover 20			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



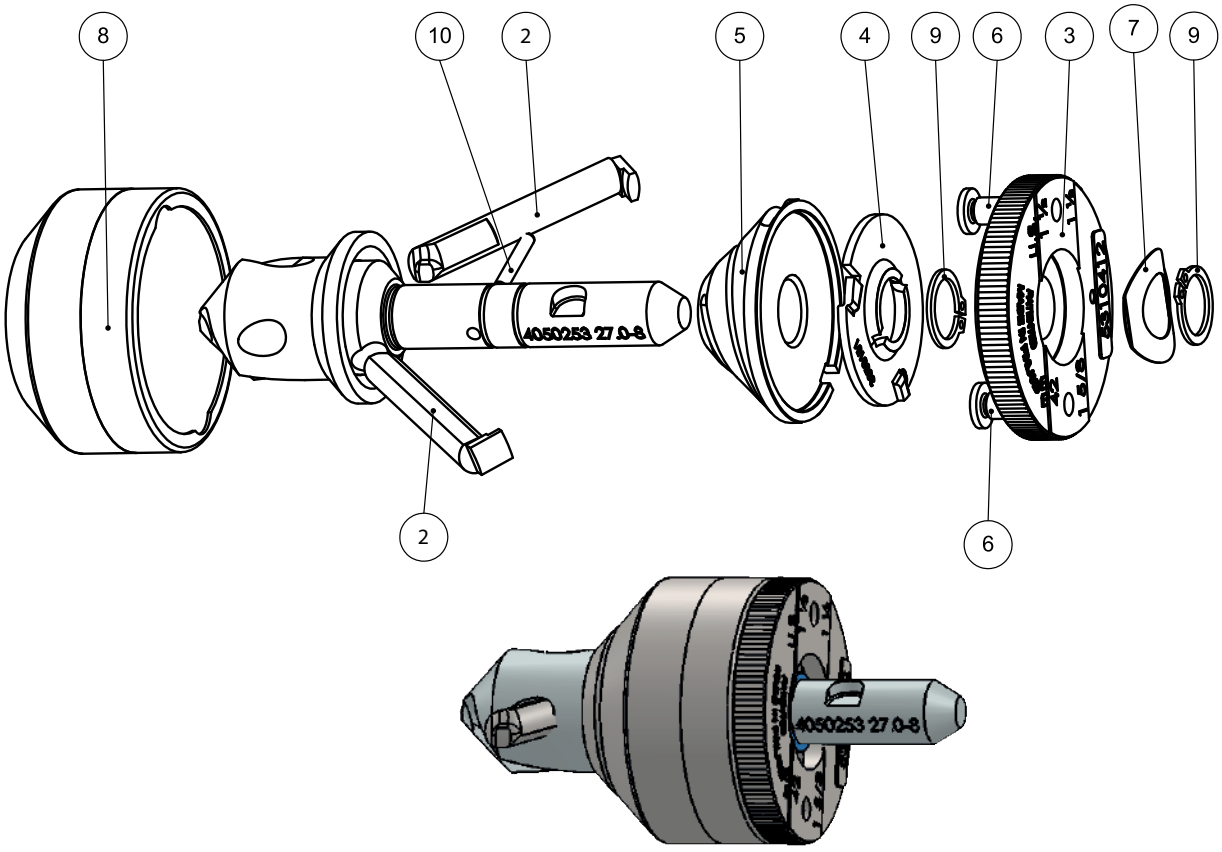
14.3.8 COLLARING HEAD Ø 35 MM (1 3/8”) 5310411

Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	4310221	Drill core	22,0-8		1
2	3430033	Forming pin	Ø8 B		2
3	4310362	Cover	35, 1 1/4" (5310411)		1
4	4310372	Screw			2
5	2310451	Cone			1
6	4310376	Spring			1
7	3050149	Conical cover	Ø38		1
8	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
9	9018038	Parallel pin	Ø3m6x20	DIN 6325	1
10	3310304	Adjusting shim			1



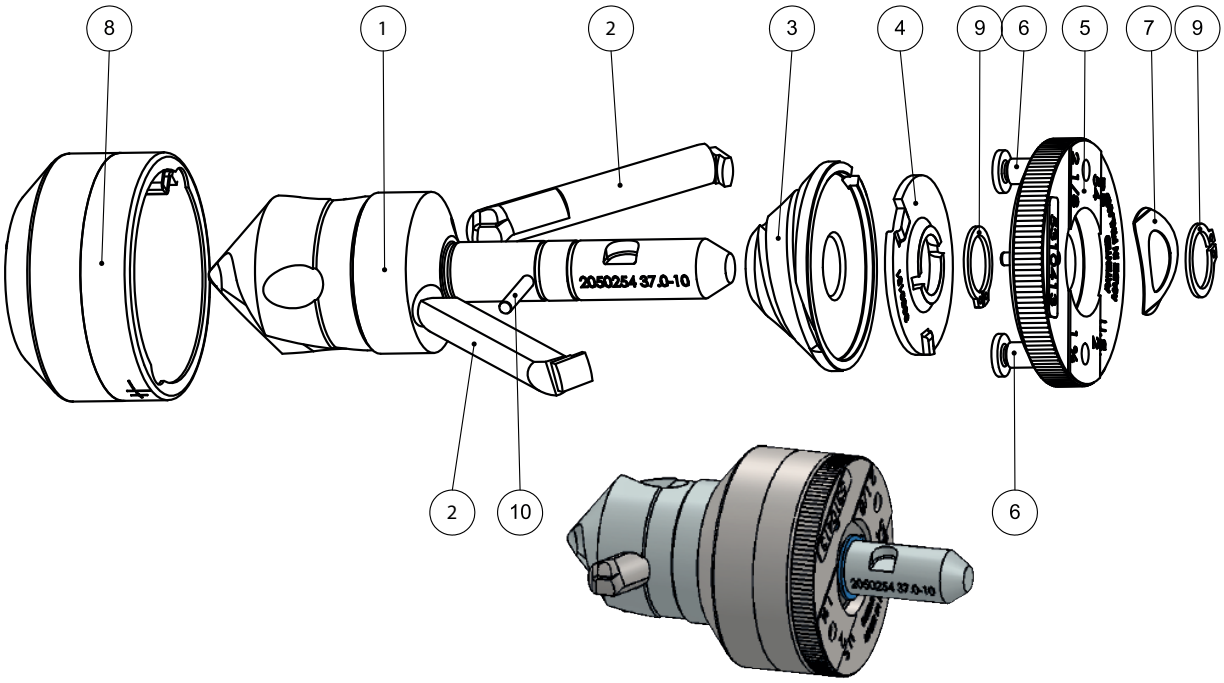
14.3.9 COLLARING HEAD Ø 42 MM (1 1/2”) 5310412

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	4050253	Drill core	27,0-8		1
2	3430033	Forming pin	Ø8 B		2
3	4310364	Cover	42, 1 1/2" (5310412)		1
4	3050151	Adjusting shim			1
5	2310451	Cone			1
6	4310372	Screw			2
7	4310376	Spring			1
8	3050149	Conical cover	Ø38		1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



14.3.10 COLLARING HEAD Ø 54 MM (2”) 5310413

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	2050254	Drill core	37,0-10		1
2	3430034	Forming pin	Ø10		2
3	2310451	Cone			1
4	3050151	Adjusting shim			1
5	4310365	Cover	54, 2" (5310413)		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3050149	Conical cover	Ø38		1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 Bl1	2
10	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



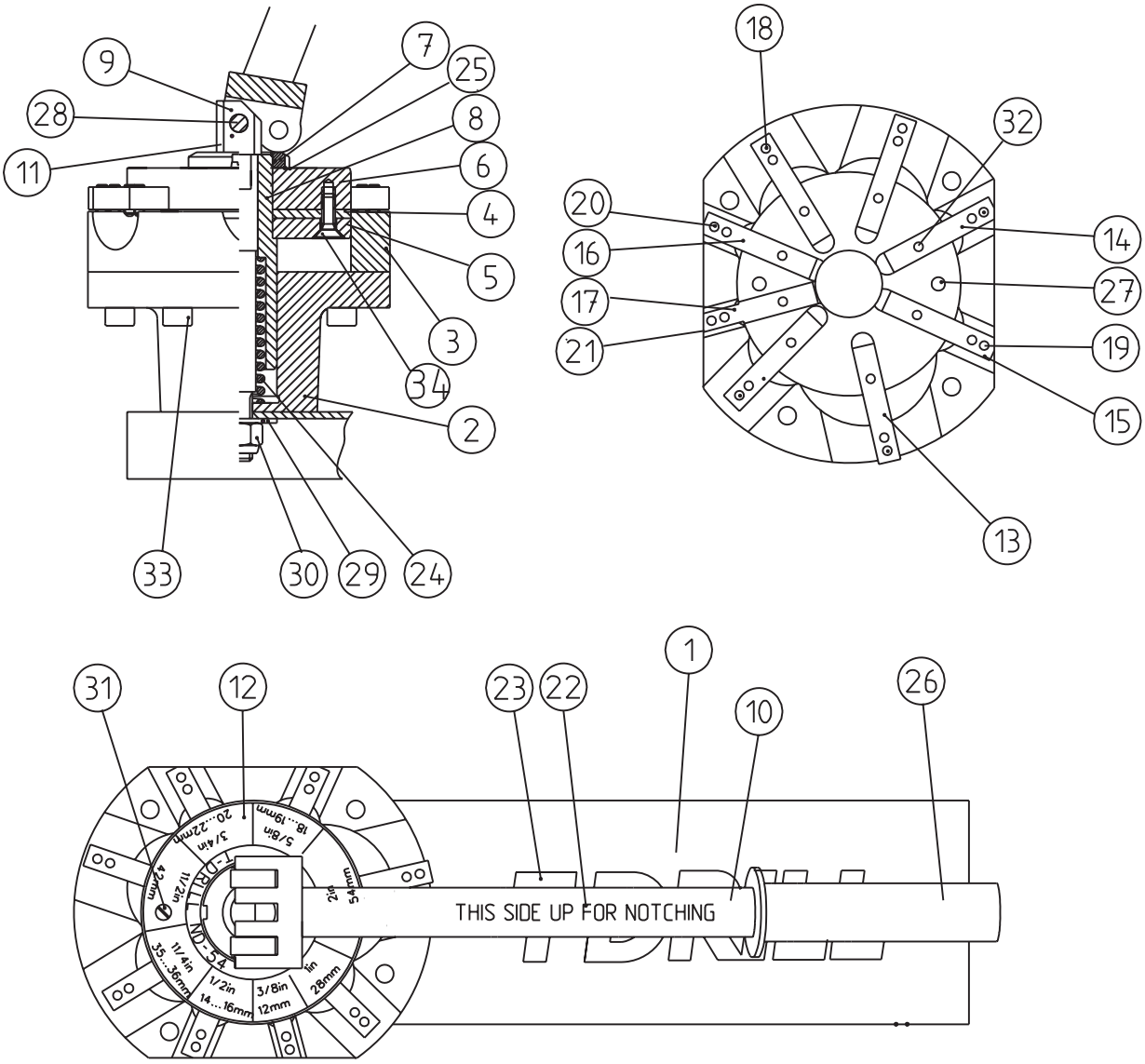
14.4 OPTIONAL EQUIPMENT

Part No.	Description
5090294	Notcher ND-54
3310461	Gauge Block
5540085	Counter Plate
5540201	Chain
9010205	Lubricant for copper 1 litre bottle
5540120	6” Retrofit kit
5330672	Universal chuck

14.4.1 NOTCHER ND-54 5090294

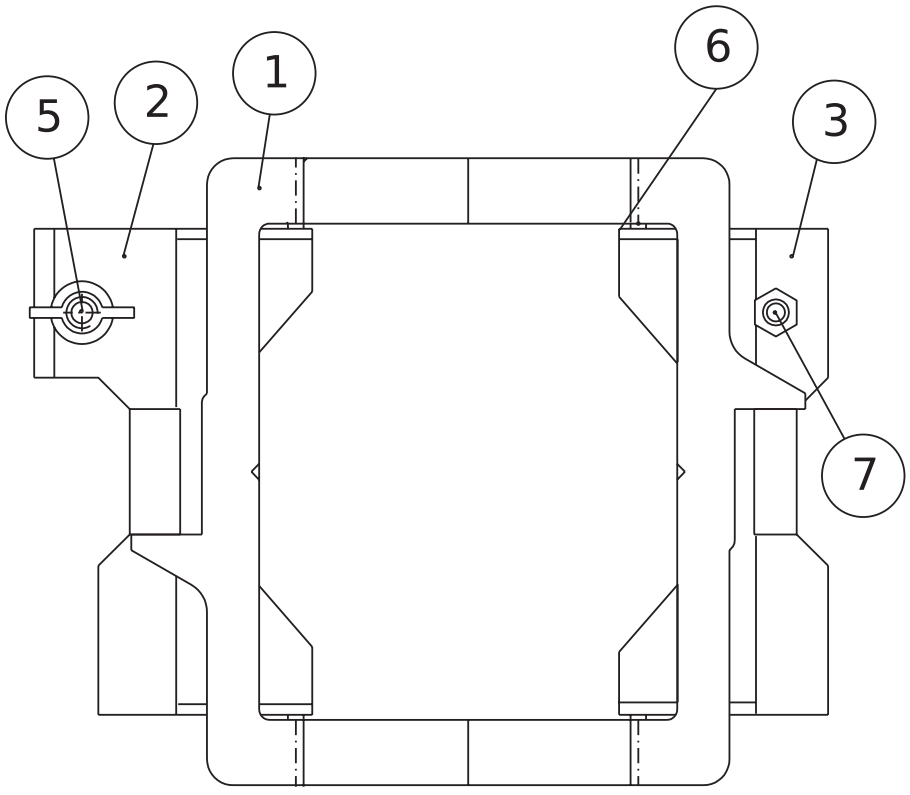
Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	4090275	Base			1
2	2090276	Body plate			1
3	2090277	Lower die			1
4	6090304	Blade	2K		1
5	6090305	Support plate	2K		1
6	6090303	Plate	2K		1
7	4090298	Nut			1
8	4090281	Tube shaft			1
9	3090282	Screw rod			1
10	3090293	Lever			1
11	4090094	Roll			2
12	3090284	Machine plate			1
13	4090285	Holder pin	28, 35, 42, 54		4
14	4090286	Holder pin	22; 3/4" NS		1
15	4090287	Holder pin	18; 5/8" NS		1
16	4090288	Holder pin	14-16; 1/2" NS		1
17	4090289	Holder pin	12; 3/8" NS		1
18	4090290	Tip	22, 28, 35, 42, 54		10
19	4090291	Tip	18		2
20	4090292	Tip	14 - 16		2
21	4090099	Notcher tip 3/8"; 12			2
22	4090258	Sticker			1
23	3090297	Decal			1
24	9026111	Pressure spring	Ø3,5/Ø16x75 SF-TF SS1774-04	Lesjöfors Springs	1
25	9020111	Shim ring	Ø30/Ø42x0.3	DIN 988	1
26	9028013	Handle	No 6 muovi (2993990)		1
27	9018021	Parallel pin	Ø6m6x28	DIN 6325	2
28	9018039	Parallel pin	Ø8m6x20	DIN 6325	3
29	6090306	Slab	2K		1
30	9013014	Self-locking nut	M12	DIN 985	1
31	9017209	Tapping screw	3.5x6,5 Zn	DIN 7981	2
32	9016303	Set screw	M6x8 12.9	DIN 916	8
33	9014038	Socket head cap screw	M8x30 8.8	DIN 912	4
34	9014308	Socket head cap screw	M6x16	DIN 7991	4

14.4.1 NOTCHER ND-54 5090294



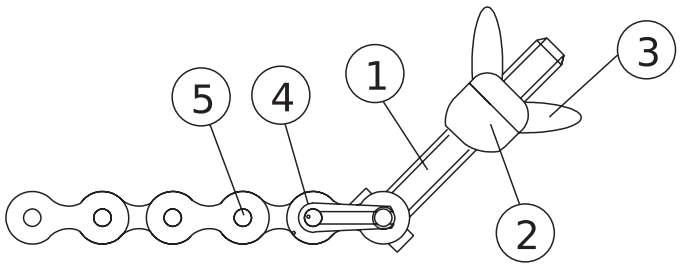
14.4.2 COUNTER PLATE 5540085

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	3540011	Counterplate			1
2	3540012	Counter plate mask.			1
3	3540013	Counterplate fem.			1
5	5540201	Chain			1
6	9018038	Parallel pin	Ø3m6x20	DIN 6325	4
7	4540070	Pin			1



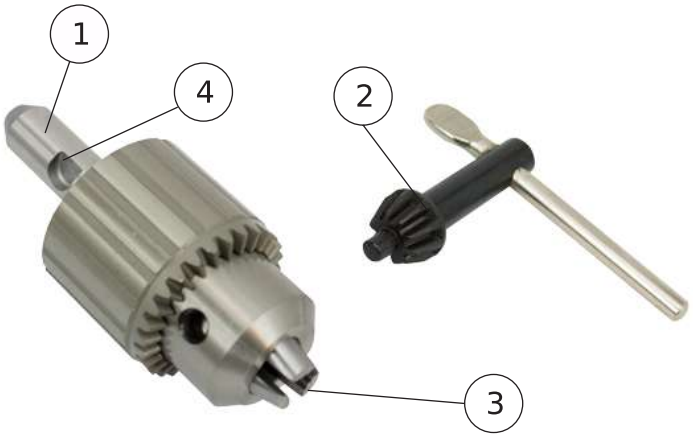
14.4.3 CHAIN 5540201

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	4050090	Screw			1
2	4540015	Knob			1
3	9013201	Wing nut	M6	DIN 315	1
4	9024117	Coupler link	1/2" 332	Wipperman	1
5	8000742	Roller chain	1/2"x275 (332)	DIN 8187 Wipperman	1



14.4.4 UNIVERSAL CHUCK 5330672

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	6310530	Spindle shaft			1
2	6330669	Wrench			1
3	6330670	Chuck	2-13mm		1
4	6330671	Screw	Drill		1



EC DECLARATION OF CONFORMITY

Manufacturer: **T-DRILL OY**

Address: **Ampujantie 32 FIN-66400 LAIHIA FINLAND**

Name of the person authorized to compile the technical file: **Juha Murtomäki**

confirms that machine

T-DRILL T-65 putkenkaulustuskone (Pipe collaring machine)	**3305**
(Make)	(Type code)

Complies with the regulations of the following other EU directives:

- Machinery Directive 2006/42/EU and any associated amendments and with any national acts to enforce it
- EC directive 2014/30/EC (Electromagnetic compatibility)
- EC directive 2014/35/EC (Low voltage directive)

And also confirms that the following harmonized standards (or their sections/parts) have been applied

EN 60745-1
EN 60745-2-1
EN 55014-1,-2
EN 61000-4-2,-3,-4,-5,-6

Laihia 16.06.2017
(Location and date)

Juha Murtomäki
(Head of the Assembly Group)

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BIC/SWIFT HANDFIHH

Y-tunnus
0548785-8
VAT No
FI 05487858

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: MOBILMET 763
Product Description: Base Oil and Additives
Product Code: 663492-00, 971506
Intended Use: Metal processing fluid

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
MSDS Requests	713-613-3661
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
OLEFIN SULFIDE		1 - 5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material may be considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

This product may be used in certain applications where misting can occur. Excessive exposure to liquids and mists may cause skin and eye irritation. In addition, excessive exposure to mists may cause respiratory irritation and damage and aggravate pre-existing emphysema or asthma. Low order of toxicity. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Oxides of carbon, Smoke, Fume, Sulfur oxides, Aldehydes

FLAMMABILITY PROPERTIES

Flash Point [Method]: >160C (320F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapors. Small metal particles from machining may cause abrasion of the skin and may predispose to dermatitis. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists / aerosols can occur, the following are recommended: 5 mg/m³ - ACGIH TLV, 10 mg/m³ - ACGIH STEL, 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.
Particulate air-purifying respirator approved for dust / oil mist is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Work conditions can greatly affect glove durability; inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended. Chemical type goggles should be worn during misting operations.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.87
Flash Point [Method]: >160C (320F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F)
Vapor Density (Air = 1): > 2 at 101 kPa
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/D
Solubility in Water: Negligible
Viscosity: 18 cSt (18 mm2/sec) at 40 C | 4.2 cSt (4.2 mm2/sec) at 100C
Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -18°C (0°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	

Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

For the product itself:

Oil Mist (highly refined oils): Animals exposed to high concentrations of mist developed oil retention, inflammation, and oil granulomas in the respiratory tract. Oils exposed to high temperatures, cracking conditions, or mixing with tramp / used oils may introduce polycyclic aromatic compounds or microbial contaminants that could result in cancer or severe respiratory hazards.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT) : Not Regulated for Land Transport

LAND (TDG) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.

NATIONAL CHEMICAL INVENTORY LISTING: AICS, DSL, EINECS, TSCA

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The Following Ingredients are Cited on the Lists Below: None.

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK

5 = TSCA 4 10 = CA P65 CARC 15 = MI 293

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 13: Empty Container Warning was modified.
Section 08: Hand Protection was modified.
Composition: Component table was modified.
Section 15: List Citation Table - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 06: Notification Procedures was modified.
Section 15: Chemical Name - Header was deleted.
Section 15: CAS Number - Header was deleted.
Section 15: List Citations - Header was deleted.
Section 15: List Citations Table was deleted.
Section 08: Exposure Limits Table was deleted.
Section 08: Exposure Limit Values - Header was deleted.
Section 08: OEL Table - Form Column - Header was deleted.
Section 08: OEL Table - Limit Column - Header was deleted.
Section 08: OEL Table - Notation Column - Header was deleted.
Section 08: OEL Table - Source Column - Header was deleted.
Section 08: Exposure Limit Values - Header was deleted.

PRECAUTIONARY LABEL TEXT:
Caution! Excessive exposure to mist may cause skin and eye irritation. In addition, excessive exposure to mist may cause respiratory irritation and damage, and aggravate pre-existing emphysema and asthma. Use with adequate ventilation. If inhaled and symptoms develop, remove to fresh air and get medical attention.

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Internal Use Only
MHC: 0, 0, 0, 0, 0, 0 PPEC: A

DGN: 7063086XUS (1011068)

More T-DRILL products for tube and pipe fabrication

HFT-2000

Semiautomatic unit for small volume production of T-DRILL collars.
-Collar sizes 10-54 mm
-Run tube sizes 15-108 mm

T-65 SS

Tube Collaring System for stainless steel pipes
-Collar sizes 20-51mm
-Run tube sizes 32 - 219.1 mm

S-54

Automatic Collaring Unit for producing single collars on straight and bent tubes.
-Collar sizes 6 - 54 mm
-Run tube sizes 8 - 108 mm

S-54 AFT

S-54 collaring unit with Automatic Feed Table (AFT).

TCC-50 MCS

Transportable manually operated cutting machine with optional cut to length setting adjustment. For tube diameters 1.5 - 45 mm

TCC-28

Automatic tube cutting machine for chipless tube cutting from coil and straight lengths. Automatic cut length setting tube diameters 4.76 - 22 mm