

T-DRILL

PRODUCTIVITY AS A PRODUCT.

INSTRUCTION MANUAL SPARE PARTS LIST



TEE FORMING MACHINE

T-35

Version

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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-35 tee forming machine**.

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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.

TEE FORMING MACHINE

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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 steel package. 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.

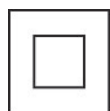
Acquaint yourself with the machine before using it. Read the operation sequence described in the instruction manual thoroughly before preparing, operating or maintenance of the machine.

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.

130°



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 its 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 determine 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.

2.3 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. T-DRILL T-35, GENERAL

3.1 INTRODUCTION

T-DRILL T-35 is a special tool designed for forming outlets mechanically in copper tubes typically found in domestic, commercial and industrial tubing systems. The T-35 extrudes an outlet in the run tube and the branch tube can be joined to the outlet by brazing.

Before using the T-35, make sure that you have read and fully understood the safety instructions, which apply to all power tools and to the capabilities of this special tool.

The T-DRILL T-35 includes an electric network-driven power unit with accessories. The power unit is double insulated 110 V or 230 V.

3.2 THE PARTS OF THE T-35



Main parts: 1. Tube support 2. T-DRILL head, 3. T-DRILL tee forming unit, 4. Power unit , 5. Connecting cord,

➡ NOTE! Delivery package includes a bottle of lubricant to be used for lubricating the forming pins and drill before every tee forming operation.

3.3 INFORMATION ABOUT ACCESSORIES

Following accessory is available:

3.3.1 NOTCHER ND-54

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



Notcher

3.3.2 GAUGE BLOCK AND RING

The correct size settings of the T-DRILL head for various tube sizes can easily be checked with the gauge block. The size range is NS 1/4"-1" with the gauge block and 1 1/4" with the ring.

3.3.3 LUBRICATION FOR COPPER

A bottle of lubricant to be used for forming the outlet in copper tube is included in the delivery.

3.4 OPERATING RANGE OF THE MACHINE

The T-DRILL T-35 is intended for forming an outlet in copper tube. The branch tube is joined to the run tube by brazing.

The outlet size range of T-35 is 10 - 35 mm (3/8"-1 3/8")

The diameter of the run tube can be 15 - 76,1mm (5/8"-3"). The maximum wall thickness of the tube to be formed 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.

TEE FORMING MACHINE

3.4.1 LUBRICATION

The collaring heads and the forming pins must always be well lubricated. Never work with dry forming pins, because that may cause a serious overload in your tool. Also thoroughly lubricate the pilot hole drill bit and the trimming tool blade before drilling and trimming.

3.5 TECHNICAL SPECIFICATIONS

T-35	Value	Note!
Type code	3311	
Tee diameter	8 – 35 mm (5/16" – 1 3/8")	
Run tube	15 - 76,1 mm (5/8" – 3")	
Max. wall-thickness	See Capacity chart	
Materials	Copper (Cu)	
Cycle	20 s	
Rotation speed of spindle	0 – 470 /min	
A-accentuated equivalent level of sound pressure	78 dB (A)	Ear protectors are recommended!
Vibration	less than 2,5 m/ s ² (8.2 ft/s ²)	
Dimensions of the unit	500 (l) x 200 (h) x 80 (d) mm 20"(l) x 8"(h) x 3"(d)	
Weight of the unit	4,1 kg/9 lbs	
Supply voltage of the unit	230 V AC/ 730 W 110 V AC/ 680 W	

4. TRANSPORT, HANDLING AND STORAGE

The T-35 is delivered in a transport box, dimensions 640 mm (25.2") x 160 mm (6.5") x 370 mm (14.6") (w x h x d). Depending on the accessories included, the weight of the box is 13 - 23 kg (29-49 lbs).

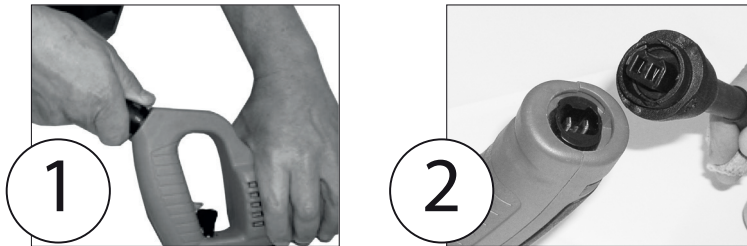
Storage

Keep the T-35 stored in a cool, dry place, covered to protect it from dust, etc.

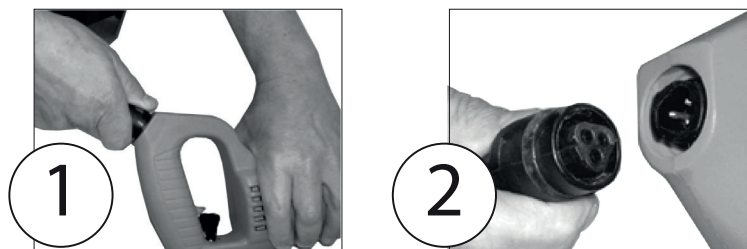
5. PREPARATIONS BEFORE USE

5.1 T-35, DETACHMENT AND ATTACHMENT OF THE CONNECTING CORD

The T-35 power unit is equipped with a connecting cord which allows quick changeovers in field conditions.



The European connecting cord



The US type connecting cord

Detachment of the cord

1. Turn the nut of the cord 1/2 turn 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 as far as it will go.
2. In order to lock the cord, turn the nut 1/2 turn to the right.

5.2 T-35 START-UP CHECK

➔ **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.
3. Test functioning before attaching a tube.

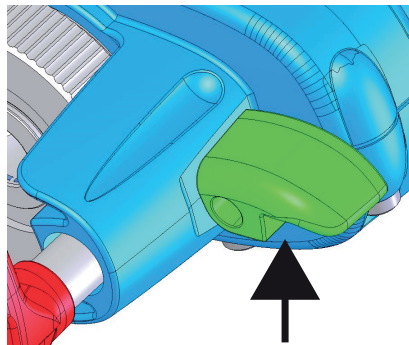
6. THE OPERATION OF THE MACHINE

6.1 DESCRIPTION OF THE CONTROL DEVICES



Control devices: 1. Feed mechanism engagement lever for outlet forming, 2. trigger

➡ **NOTE!** Use maximum speed of rotation when drilling and forming the outlet - when working press the trigger completely down!



Feed mechanism lever

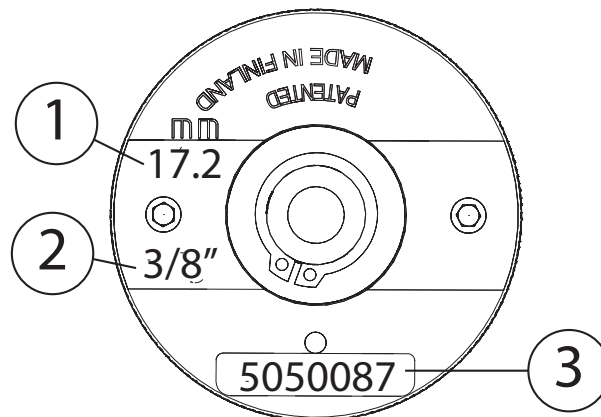
The feed mechanism lever is situated near the chuck ring. The feed mechanism is **engaged (on)** when the lever is turned out, i.e. as shown on the illustration. If the feed mechanism lever does not engage smoothly, rotate the motor by “pumping” the trigger for a while.

➡ **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:

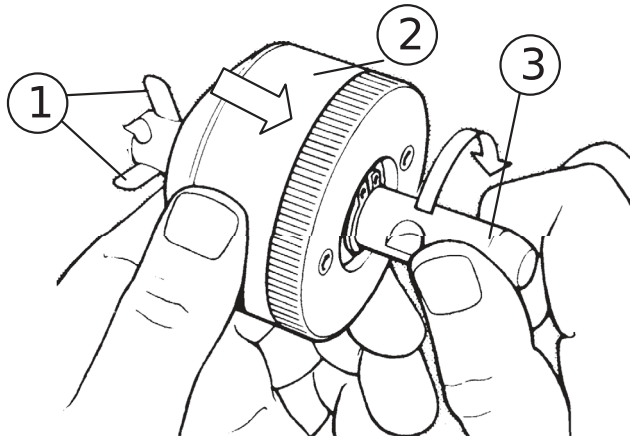


Identification: 1. Actual size in millimeters, 2. Nominal size in inches (NS), 3. The ordering and identification number of the T-DRILL head

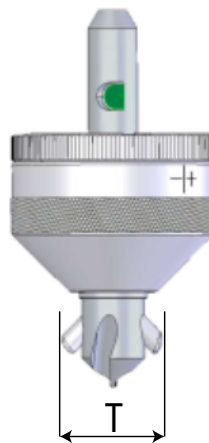
6.2.2 THE FINE ADJUSTMENT OF THE OUTLET DIAMETER

➔ **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.



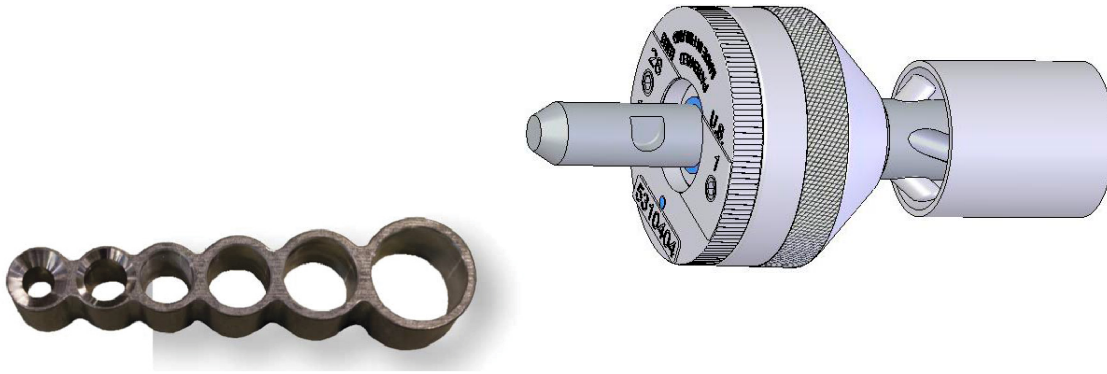
To extend the forming pins (1) press the cover (2) in direction of the shank. Twist the shank (3) at the same time clockwise until a positive stop is reached, and the forming pins extend.



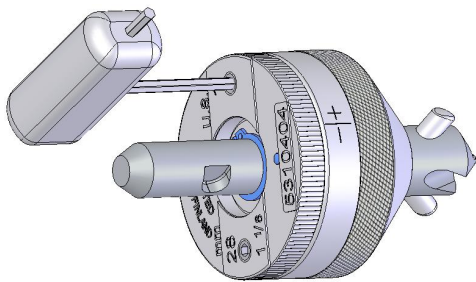
Check the forming pin span diameter T

Depending on the size of the T-DRILL head, the forming pin span T should be 0,5 – 1,4 mm (0.020" – 0.055") bigger than the branch pipe's outer diameter (O.D.)

To obtain correct joint diameter a fine adjustment is occasionally needed.



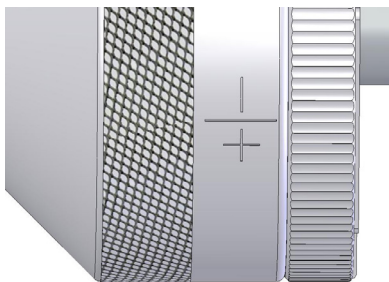
You can check the forming pin span diameter T with an adjusting ring (option)



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

2. To enlarge the outlet rotate the conical cover in the plus (+) direction. Hold the cover plate stationary.

To make a smaller outlet rotate the conical cover in the minus (-) direction while holding the cover plate stationary.



One notch on the cover-plate equals to 0,25 mm or 0.01" on the forming pin span.

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

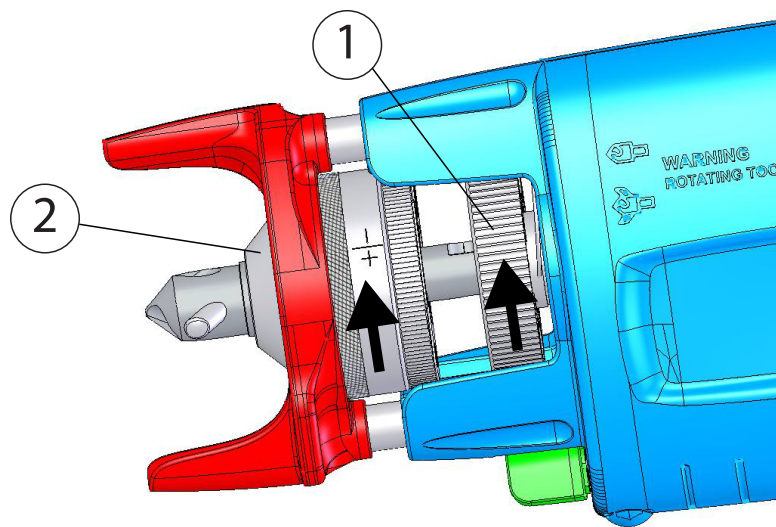
6.3 CHUCKING THE T-DRILL HEAD

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

Rotate the locking ring (1) and head (2) in the same direction one quarter of a turn (1/4) and simultaneously pull the T-DRILL head straight out. Release the locking ring.

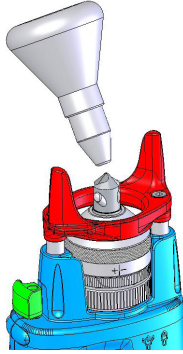
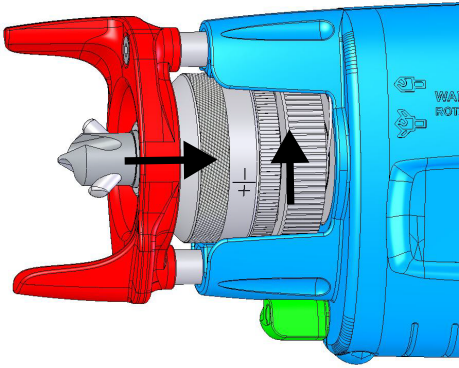
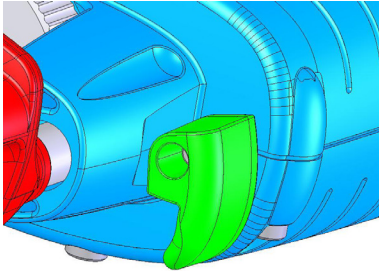


Chucking the T-DRILL head and removing it. 1. Locking ring, 2. T-DRILL head

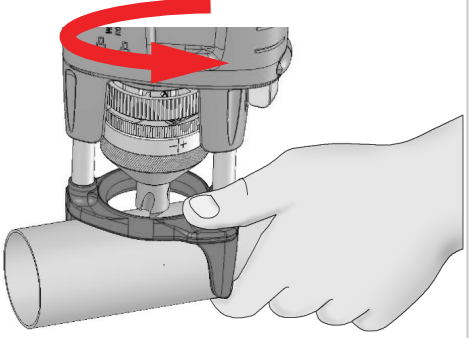
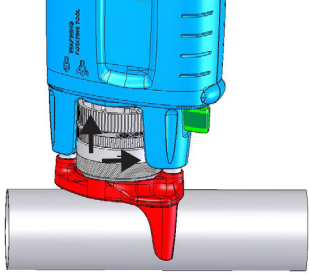
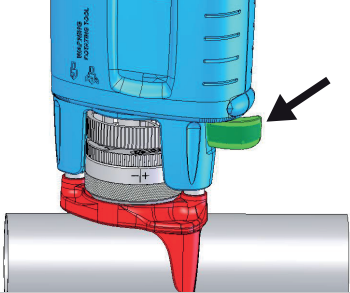
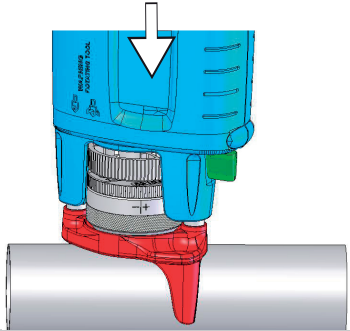
6.4 TEE FORMING PROCESS WITH THE T-DRILL T-35

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 outlets 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 section 6.2.2).	
3. Chuck the T-DRILL head.	
4. Lubricate the T-DRILL head before every 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 feed mechanism lever is in the "off" position.	

TEE FORMING MACHINE

<p>7. Pull the tube support out and place the tube support firmly onto the point where the outlet 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.</p>	
<p>8. Start the tool by pressing the trigger and drill until the bit has fully penetrated the tube. Release the trigger - the machine will stop.</p>	
<p>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 forming position.</p>	
<p>➔ NOTE! Do not extend the forming pins while the motor is running!</p>	
<p>10. Turn the selector knob. Engage the feed mechanism as shown. If it does not engage smoothly, rotate the motor by “pumping” the trigger for a while.</p>	
<p>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 operation, keep the tube support against the tube and push the tool toward the tube. This ensures that you obtain a circular outlet.</p>	
<p>12. Once the T-DRILL head has come completely out of the outlet, release the trigger. The outlet is now ready.</p>	

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.

6.5 ANNEALING OF TUBE

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

1. Heat the point of the tube where the outlet will be formed until it is glowing red.
2. Allow the tube to cool. You can speed up the cooling process with water, for example. The tube will retain its workability properties after annealing even once the tube has cooled down.
3. Drill a pilot hole into the tube.
4. Start the forming process.

➔ **NOTE!** Always lubricate the T-DRILL head before each work cycle.

➔ **NOTE!** T-DRILL recommends that tubes are annealed whenever the formed outlet is as large as the tube itself.

➔ **NOTE!** Whenever the formed outlet is as large as the tube itself it may be necessary to slightly oversize forming pins to compensate for springback in copper tube wall.

➔ **NOTE!** Any burrs or lubricant left on the inner surface of the outlet must be removed from the tube before brazing.

➔ **NOTE!** The branch tube is joined to the run tube by brazing.

TEE FORMING MACHINE

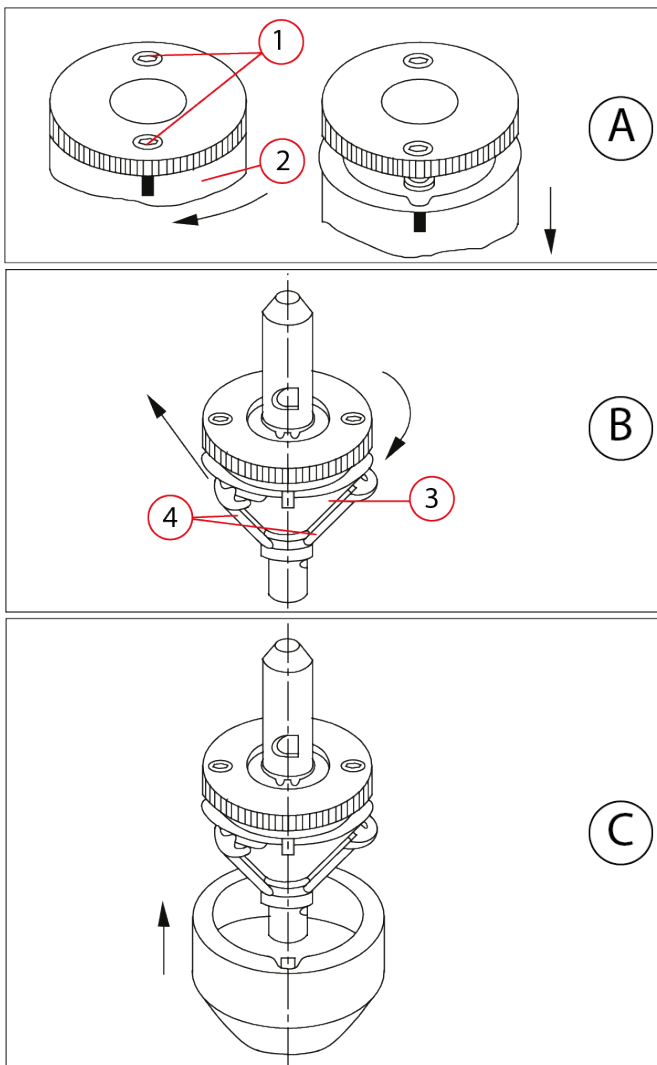
7. MAINTENANCE

7.1 MACHINE MAINTENANCE

The T-DRILL T-35 is prelubricated and does not need special attention for maintenance. Clean dust and dirt from machine surface and power unit vents periodically.

► **NOTE!** All other maintenance measures that need to be performed on the T-35 tee-forming machine or the power unit during the warranty period must be carried out by certified TDRILL service agents.

7.2 POLISHING AND REPLACEMENT OF THE FORMING PINS



A. Loosen the two screws (1) on the cover plate one turn and rotate the conical cover (2) with respect to the cover plate so that the conical cover can be removed.

B. When the conical cover is removed rotate the cone (3) so that the forming pins (4) will slide from the shank.

The forming pins can now be replaced or polished using a felt polishing wheel.

C. Reassemble the T-DRILL head using new forming pins and adjust to the correct outlet diameter.

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.
	The machine is not powerful enough to form a tee in the tube.	Consult the capacity chart
Burr in the tee that has been formed	Burrs in the pilot hole: - The drill bit is dull - Not enough lubricant - Poor-quality lubricant	- Anneal area to be drilled - Change drill core - Use more lubricant - Only use lubricant recommended by T-DRILL
	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 slack.	Tighten the screws
The forming pins or the drill shank breaks.	Burrs in the pilot hole: drill bit dull	Resharpen or change the drill core.
	The wall thickness of the tube exceeds the max. allowed thickness.	See the 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.
	The tool is not straight against the pipe.	Check the angling of the machine.

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

TEE FORMING MACHINE

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

Disposal of the T-DRILL machine

Various kinds of metals, plastics and lubricants have been used in the manufacture of the T-DRILL machines. Dispose of your T-DRILL machine according to federal, state and local regulations.

10. T-DRILL STANDARD WARRANTY

T-Drill agrees to warrant to the original purchaser, that the Product is free from defects in material and workmanship under normal use and service. The warranty period is: (a) twelve (12) months from the date of taking-over, or (b) 2000 hours of operation from the date of taking-over, or (c) eighteen (18) months from the date of delivery to the Customer, whichever occurs first. For spare parts and packages for retrofit the warranty period is 6 months from the date of delivery to the Customer. Warranty is not transferable from the original purchaser to further owners.

Extended warranty shall be available only subject to separate written Service agreement between T-Drill and the Customer.

In the event that the Customer wants to avail itself of this warranty, the Customer shall complete the Warranty Claim Form and send it to T-Drill without delay, and in any event within seven (7) days of the Customer being put on notice of the defect. The Customer shall, immediately upon being put on notice of a defect in the Product, take all reasonable steps to avoid aggravation of the defect or further damage to the Product.

In the event of a valid warranty claim, T-Drill shall, at its sole discretion, have the option of repairing or replacing the relevant part or parts free of charge and supplying them to the Customer. In such cases, replaced parts may be either new or factory refurbished, at T-Drill's discretion. Repair or replacement services shall be carried out by the Customer at its own risk and expense. The Customer shall ensure that T-Drill or any third party appointed by T-Drill have all necessary access to the Product in question. In no event shall the Customer have a right to return any Product without the prior written consent

of T-Drill. The Customer acknowledges and agrees that the provisions of this warranty constitute the sole and exclusive remedy available to it with regard to said defective Products.

This warranty shall not extend to any Product which has been: (a) rendered in need of repair due to normal wear and tear; (b) subjected to unusual physical or other stress (e.g. from electricity, gas, water or compressed air), misuse, neglect, accident or abuse, or damaged by any other external causes; (c) repaired or altered by any third party or maintenance is carried out by other than T-Drill authorized service provider; (d) improperly installed by any third party; (e) installed on foundations or in environmental conditions which are not in accordance with specifications; (f) used or maintained in violation of instructions furnished by T-Drill; (g) rendered defective due to materials, components, use of other spare parts than T-Drill's original spare parts, or design provided by T-Drill; or (h) rendered defective or in need of repair due to any other cause which is not under the control of T-Drill. The warranty does not cover defects which are insignificant to the use of the Product, such as repair of superficial scratches. In addition the warranty does not cover the adjustments or structural changes to the Product, nor any per diem, traveling costs, freights or remuneration for out-of-operation days.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, ALL WARRANTIES, CONDITIONS, REPRESENTATIONS, INDEMNITIES AND GUARANTEES WITH RESPECT TO THE PRODUCT, WHETHER EXPRESS OR IMPLIED, ARISING BY LAW, CUSTOM, PRIOR ORAL OR WRITTEN STATEMENTS BY T-DRILL OR OTHERWISE (INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE) ARE HEREBY OVERRIDDEN, EXCLUDED AND DISCLAIMED.

LIMITATION OF LIABILITY

UNDER NO CIRCUMSTANCES WILL T-DRILL OR ITS AFFILIATES BE LIABLE FOR ANY CONSEQUENTIAL, INDIRECT, SPECIAL, PUNITIVE, OR INCIDENTAL DAMAGES OR LOST PROFITS, WHETHER FORESEEABLE OR UNFORESEEABLE, BASED ON CLAIMS OF THE CUSTOMER (INCLUDING, BUT NOT LIMITED TO, CLAIMS FOR LOSS OF GOODWILL, LOSS OF SHARE VALUE OR INVESTMENT, USE OF MONEY OR USE OF THE PRODUCTS, INTERRUPTION IN USE OR AVAILABILITY, STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS), ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTIES, BREACH OF CONTRACT, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE, EXCEPT IN THE CASE OF PERSONAL INJURY CAUSED DESPITE THE PROPER USE OF THE PRODUCTS, IF AND TO THE EXTENT REQUIRED BY APPLICABLE LAW. IN NO EVENT WILL THE AGGREGATE LIABILITY WHICH T-DRILL OR ITS OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR AFFILIATES MAY INCUR IN ANY ACTION OR PROCEEDING EXCEED THE TOTAL AMOUNT ACTUALLY PAID TO T-DRILL BY THE CUSTOMER FOR THE SPECIFIC PRODUCT THAT DIRECTLY CAUSED THE DAMAGE.

TEE FORMING MACHINE

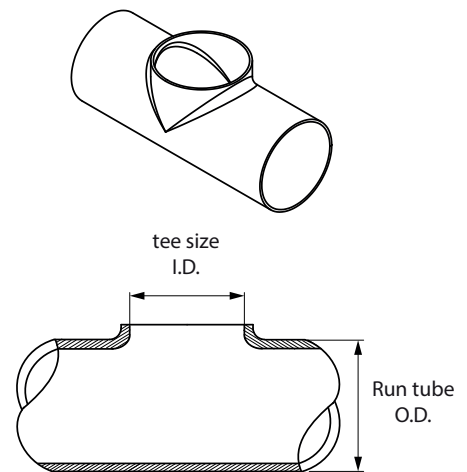
11. SUPPLEMENT

11.1 CAPACITY CHART

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 inches.
2. From the horizontal black row, find the inner diameter of the outlet size you need (I.D.) (same as outer diameter of branch tube), and from the vertical black column the outer diameter of your run tube (O.D.).
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 outlets in copper tubes
Max wall-thicknesses (mm)

11.2 CAPACITY AND INSTRUCTION CHART FOR T-DRILL T-65 ON M, L, & K COPPER TUBING

		RUN TUBE SIZE						
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
OUTLET TUBE	1/2"	A, N	N	N	N	N	N	A, D, N
	3/4"		A, N	N	N	N	N	A, D, N
	1"			A, N	N	N	N	A, N
	1 1/4"				A, N	N	N	A, N

A = Anneal outlet area to dull red 1400°F.

N = Normal tee forming procedure.

D = Deburr pilot hole to make way for pins to extend.

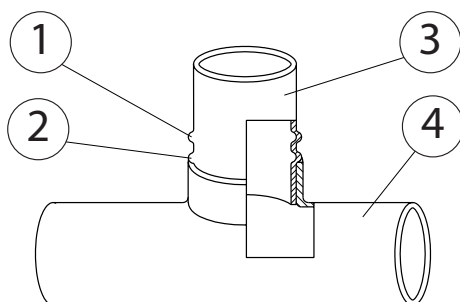
➡ **NOTE! Lubricate drill bit and forming pins with T-DRILL lubrication on every outlet.**

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	1/2
14-16	5/8
18	3/4
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. Spare parts list.

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 its side and loosen the nut.

Now 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 assy 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 assy 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 \varnothing 6 mm are on the same line. Upper die's position must be such that the two smallest dies are on the left of 54 mm (2") dies.

Hammer the pins \varnothing 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

NOTES

TEE FORMING MACHINE

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 which is on the T-65 machine handle, near the trigger. 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, make a copy of the Service Sheet, fill it out and fax or mail it, or send an e-mail.

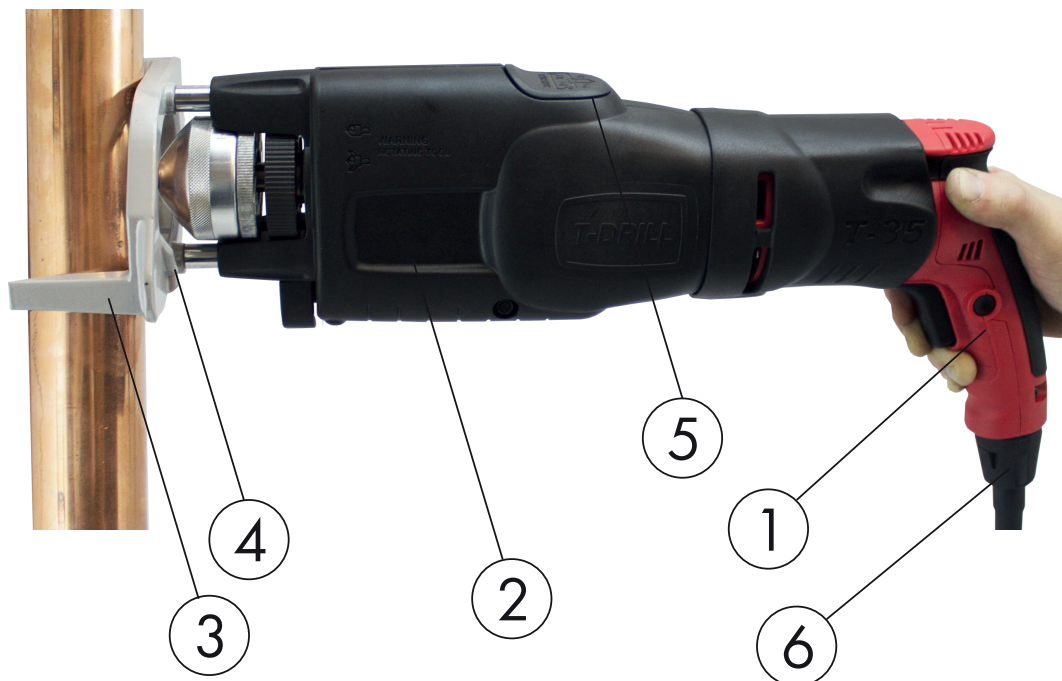
To proceeding this way you will prevent misunderstandings and you make sure to receive the correct spare parts and a prompt service.

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

14. SPARE PARTS LIST

COLLARING MACHINE

14.1 T-35 PIPE COLLARING MACHINE



Part No.	Complete assembly
5330623	T-35 220-240V Europe
5330625	T-35 110V Japan
5330626	T-35 110V G.B.

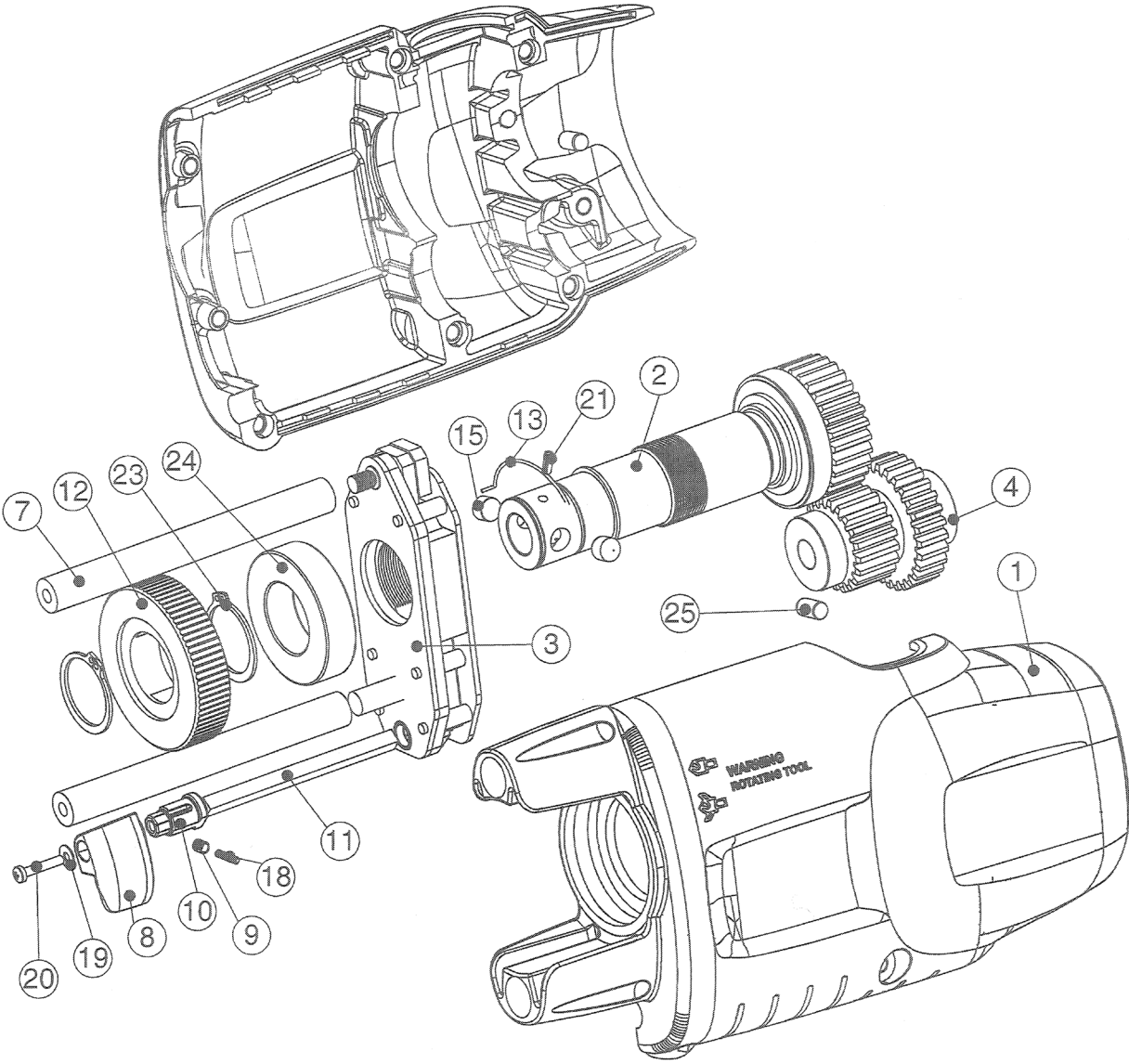
Pos	Part No.	Name	Qty	
1	5330627	Power unit 220-240V Europe	1	
	5330628	Power unit 120V USA		
	5330629	Power unit 110V Japan		
	5330629	Power unit 110V G.B.		
2	5330174	Tee Forming Unit	1	
3	3330076	Tube support	1	
4	9114027	Socket head cap screw	2	
	6330632	Machine plate, 220-240V Europe		
	6330633	Machine plate, 120V USA		
	6330634	Machine plate, 110V Japan		
5	6330635	Machine plate, 110V G.B.	1	
	9048320	Cable, 220-240V Europe		1
	9048331	Cable, 110V Japan		
	9048342	Cable, 110V G.B.		

14.2 THE T-35 TEE FORMING UNIT 5330174

Pos	Part No.	Description	Size/type	Std./manuf.	Qty
1	5330171	Enclosure	T-D35/T-35		1
2	5330138	Lead screw			1
3	5330097	Nut assembly			1
4	5330017	Reduction gear			1
7	4330099	Push rod			2
8	3330074	Lever			1
9	4540068	Tip			1
10	3330075	Fastening bush			1
11	4540056	Bar			1
12	3300056	Chuck ring			1
13	4300055	Chuck spring			1
15	4300054	Chuck pin			2
18	9026146	Pressure spring	Ø0.4/Ø2.0x10,6 SS2387	Lesjöfors Springs	1
19	9012205	Wave washer	Ø3.2x6x0,4 DIN 137 A	DIN 137	1
20	9017033	Crosshead screw	M3x16 5.8 Zn	DIN 7985	1
21	9018206	Spring pin	Ø3x8	DIN 1481	1
22	3330073	Cap			1
23	9019007	Retaining ring	Ø25x1.2	DIN 471 BI1	2
24	9021006	Groove ball bearing	Ø25/Ø47x12 6005-2RS	DIN 625	1
25	9018089	Parallel pin	Ø6m6x12	DIN 6325	2

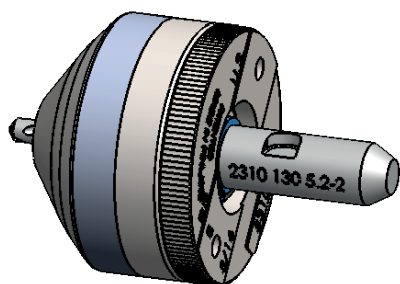
COLLARING MACHINE

14.2 THE T-35 TEE FORMING UNIT 5330174

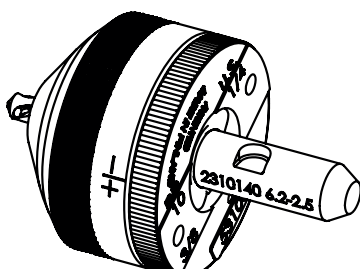


14.3 T-DRILL COLLARING HEADS

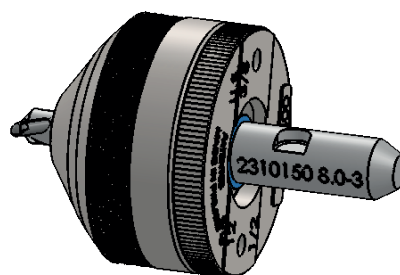
Tee Size \varnothing mm	8	10	12	15	18	22	28	35
Actual Tee Size \varnothing inch	5/16	3/8	1/2	5/8	3/4	7/8	1 1/8	1 3/8
Order No.	5310408	5310399	5310400	5310401	5310402	5310403	5310404	5310411



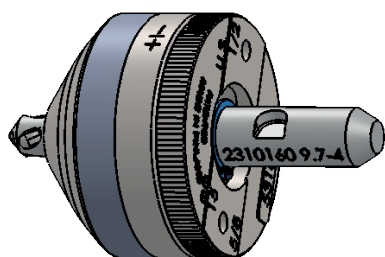
5310408 / 5310398



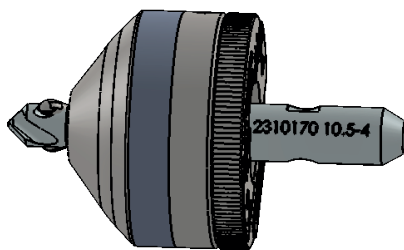
5310399



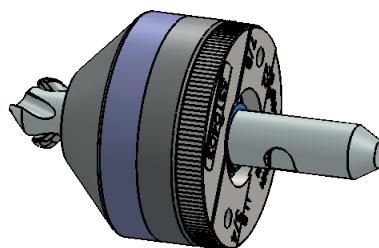
5310400



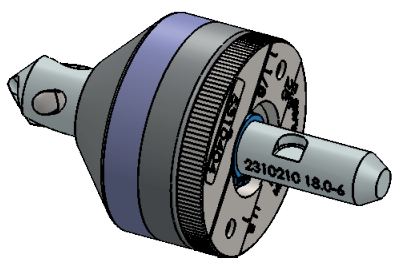
5310401



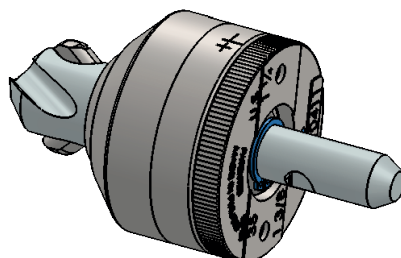
5310402



5310403



5310404

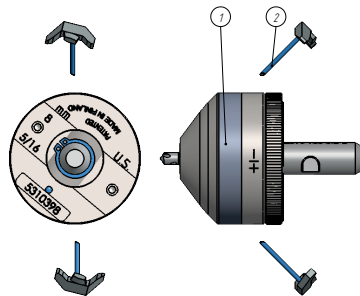


5310411

COLLARING MACHINE

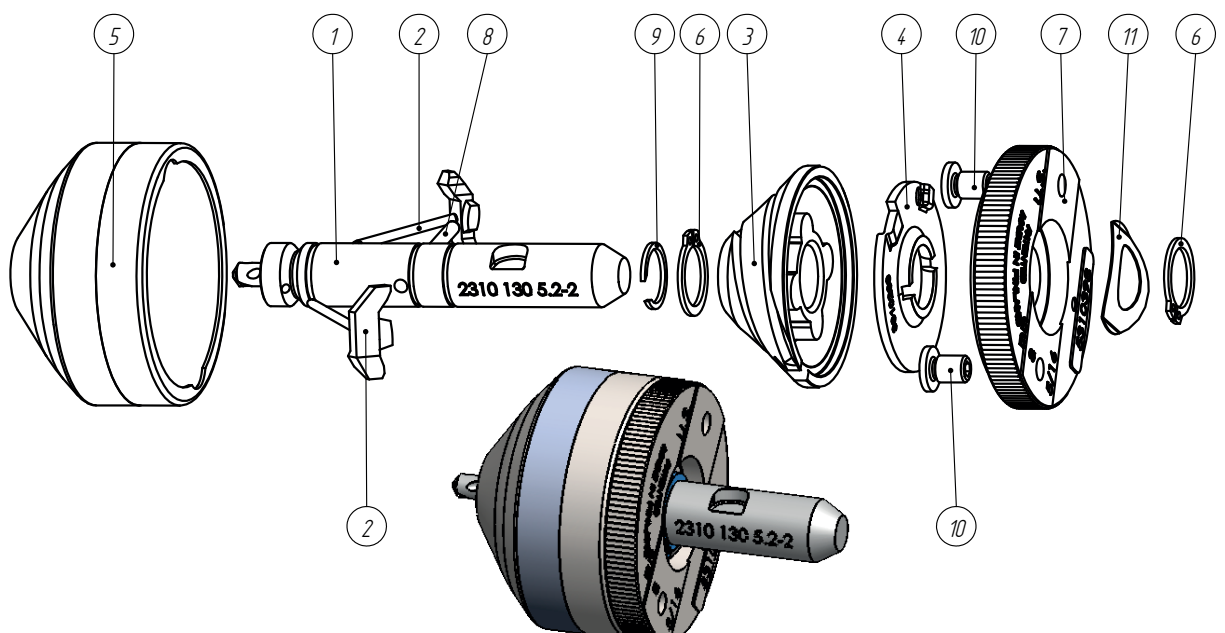
14.3.1 COLLARING HEAD 5310408A Ø 8 (5/16") AND PAIR OF PINS

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



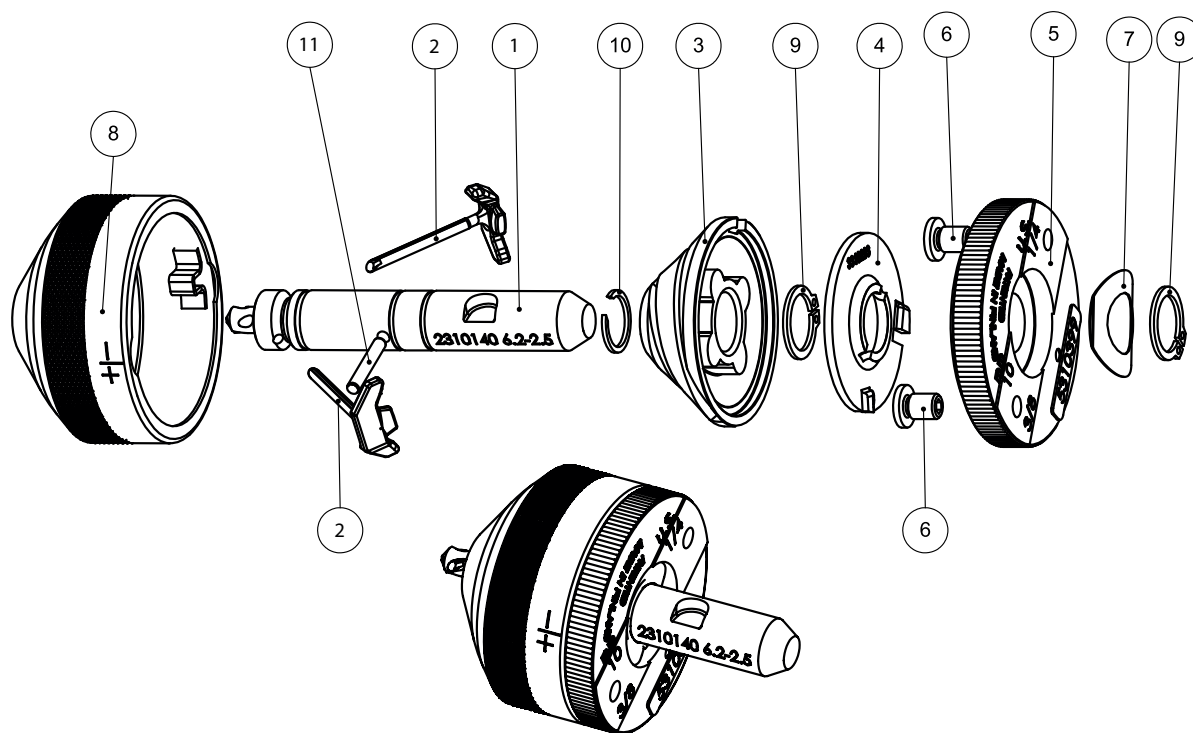
14.3.1.1 COLLARING HEAD 5310398 Ø 8 (5/16")

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 B11	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 5310399B Ø 10 (3/8")

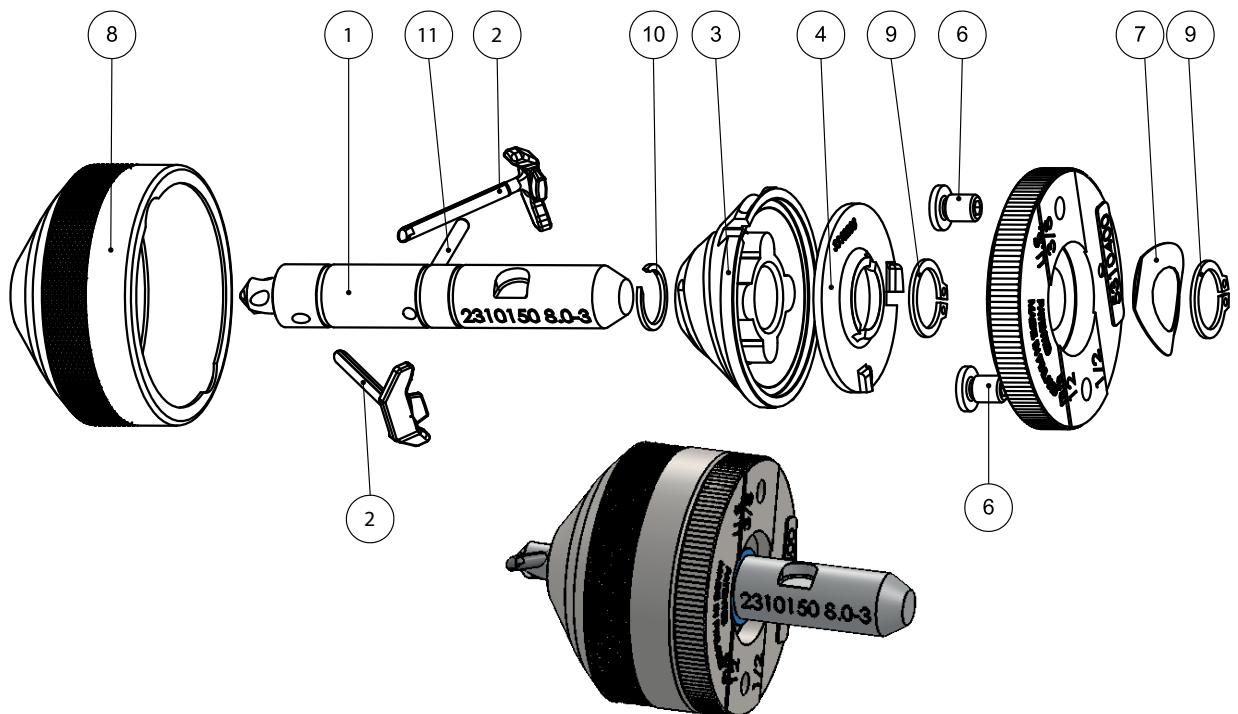
Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310140	Drill core	6,2-2,5		1
2	3310468	Forming pin	Ø2.5		2
3	2310283	Cone			1
4	3310293	Adjusting shim			1
5	4310323	Cover	Ø10, 1/4"		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310380	Conical cover 14			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 B11	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



COLLARING MACHINE

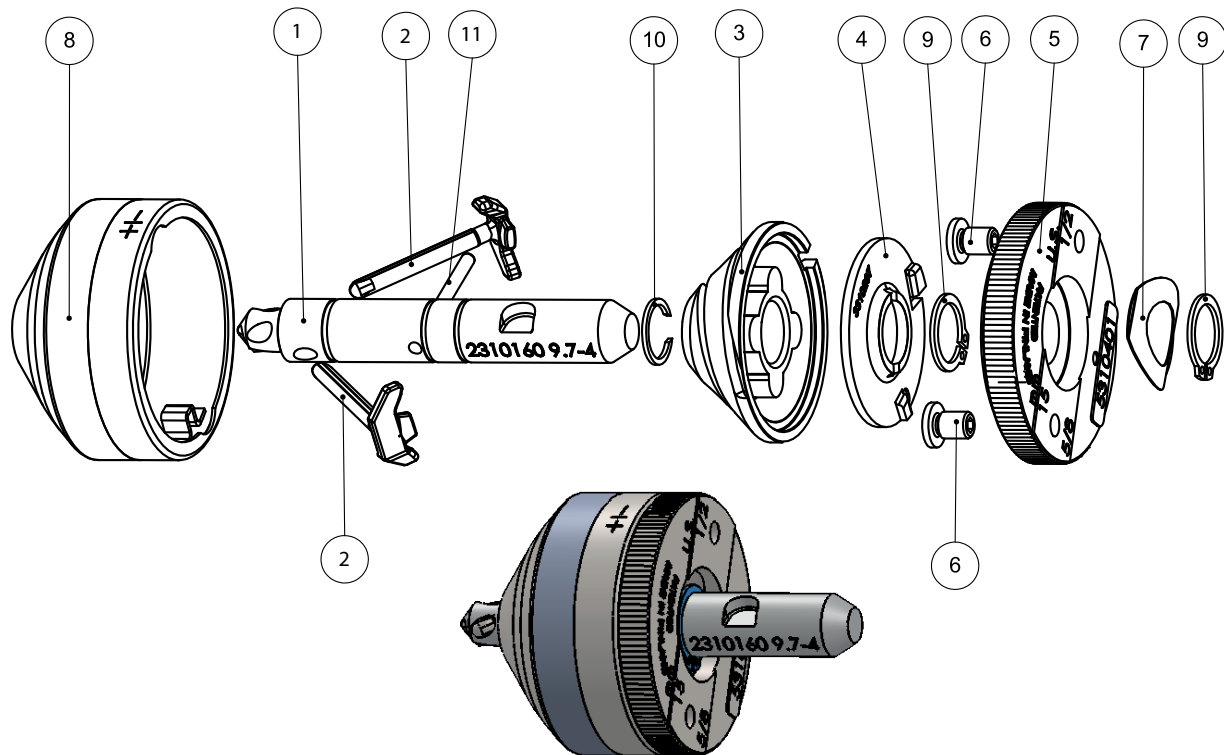
14.3.3 COLLARING HEAD 5310400C Ø 12 (1/2")

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 B11	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



14.3.4 COLLARING HEAD 5310401 Ø 15 (5/8")

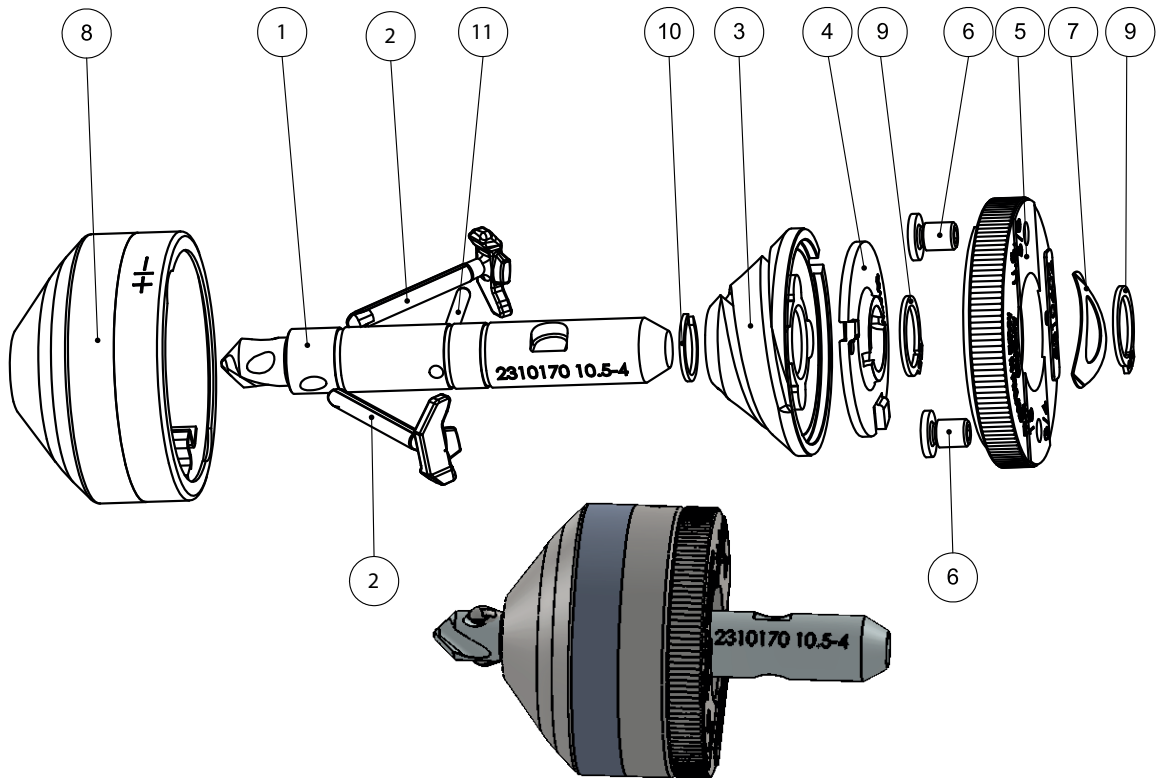
Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310160	Drill core	9,7-4		1
2	6310551	Forming pin	CrN Ø4,0		2
3	2310283	Cone			1
4	3310297	Adjusting shim			1
5	4310335	Cover	Ø15, 1/2" (5310401)		1
6	4310372	Screw			2
7	4310376	Spring			1
8	3310380	Conical cover 14			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 B11	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



COLLARING MACHINE

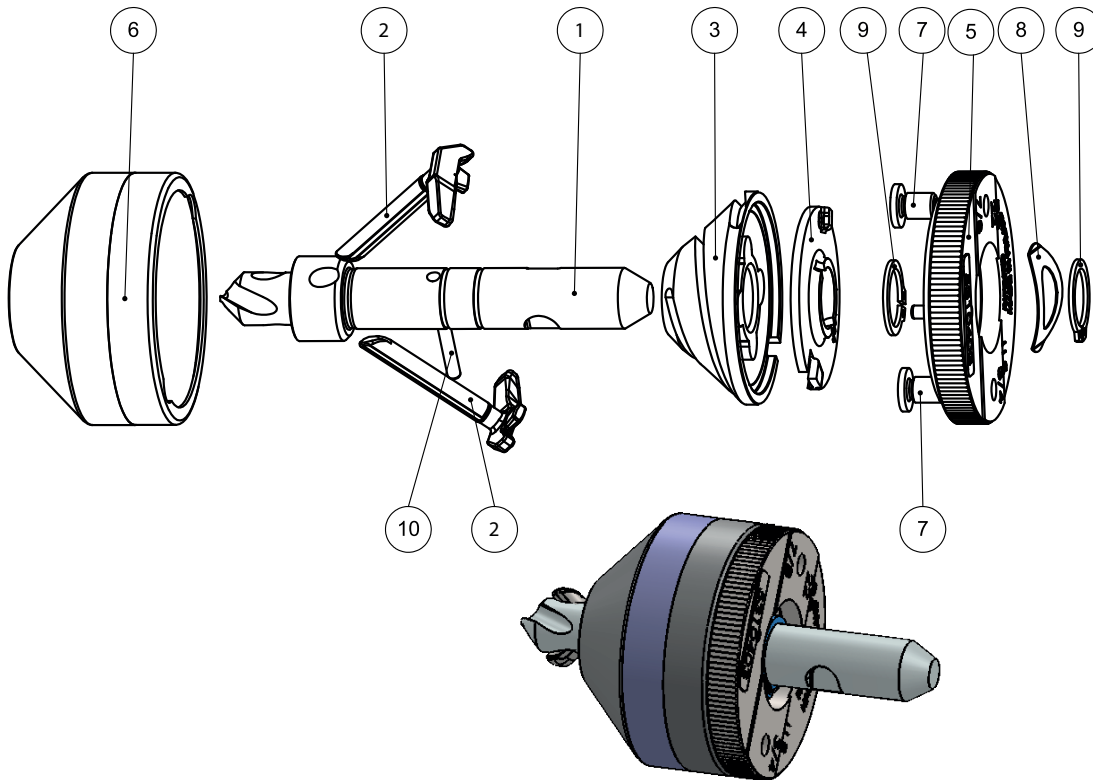
14.3.5 COLLARING HEAD 5310402 C Ø 18 (3/4")

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 B11	2
10	9019201	Retaining ring	Ø14x1.2 Seeger SW		1
11	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



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

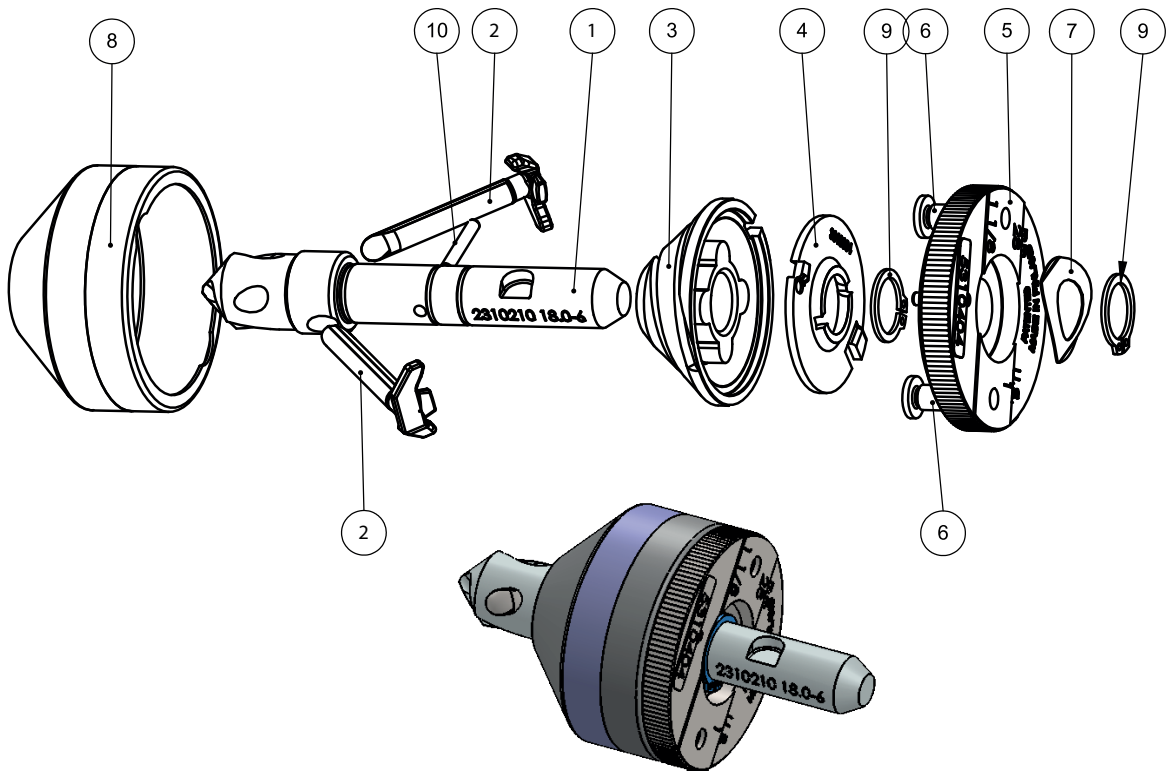
Pos.	Part No.	Name	Size / type	Standard/manuf.	Qty
1	2310180	Drill core	12,2-5		1
2	4310473	Forming pin P5			2
3	2310283	Cone			1
4	3310304	Adjusting shim			1
5	4310347	Cover	Ø22 (5310403)		1
6	3310389	Conical cover 20			1
7	4310372	Screw			2
8	4310376	Spring			1
9	9019003	Retaining ring	Ø14 x 1	DIN 471 B11	2
10	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



COLLARING MACHINE

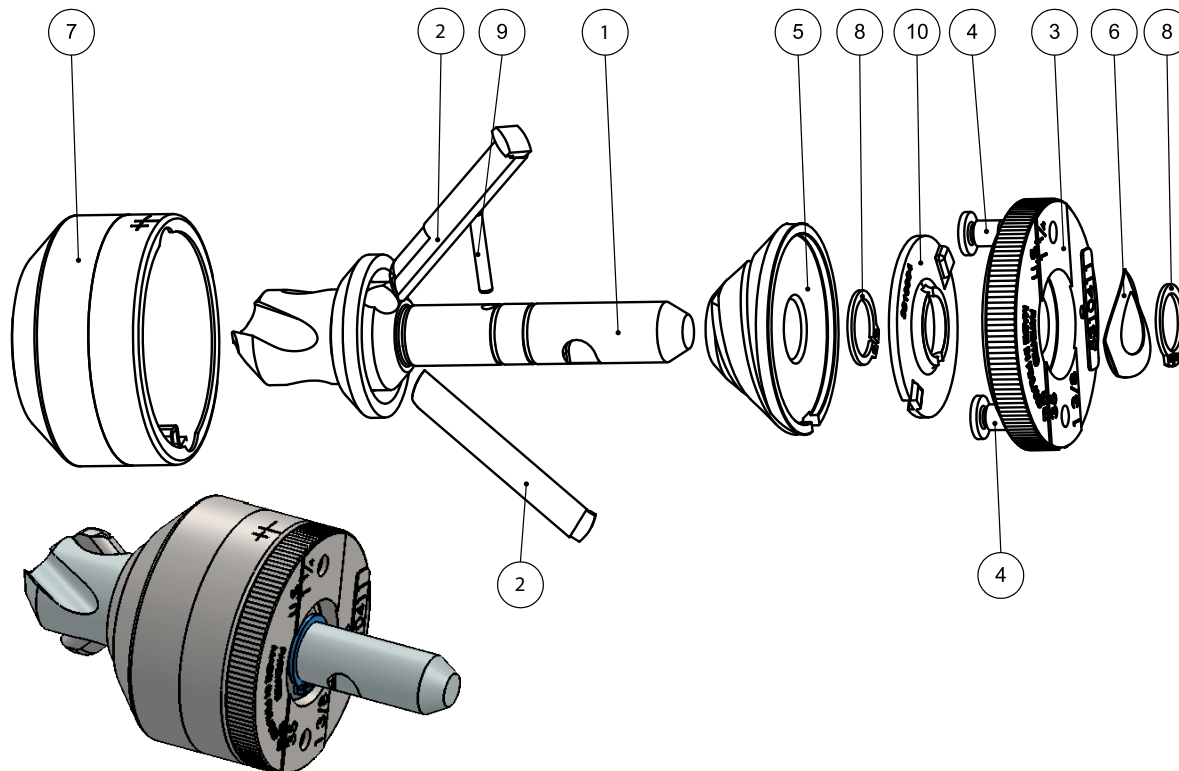
14.3.7 COLLARING HEAD 5310404 D Ø 28 (1 1/8")

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 B11	2
10	9018038	Parallel pin	Ø3m6x20	DIN 6325	1



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

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 B11	2
9	9018038	Parallel pin	Ø3m6x20	DIN 6325	1
10	3310304	Adjusting shim			1



14.4 OPTIONAL EQUIPMENT

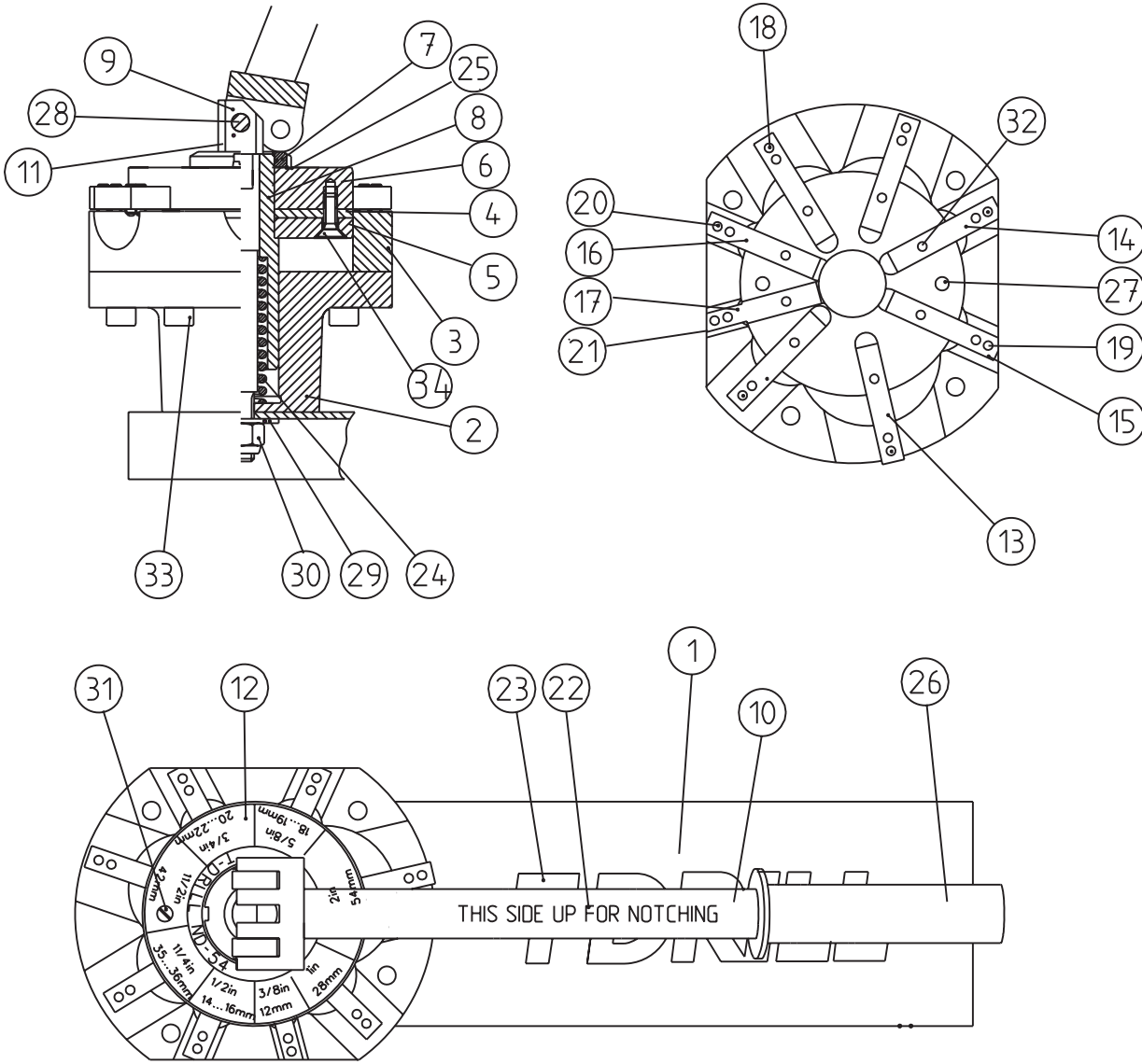
Part No.	Name	Size, standard, manufacturer	Qty
1	5090294	Notcher ND-54	1
2	9010205	Bottle of lubrication	1

14.5 NOTCHER ND-54 5090294

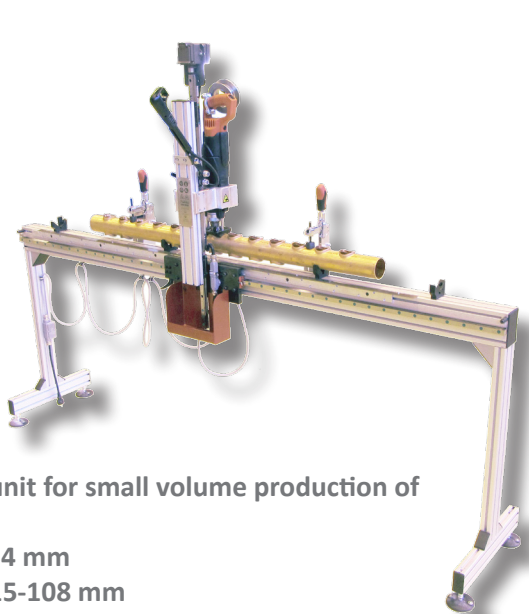
Pos	Part No.	Name	Qty
1	4090275	Base	1
2	2090276	Body plate	1
3	2090277	Lower die	1
4	6090304	Upper die	1
5	6090305	Support plate for upper die	1
6	6090303	Holder pin plate	1
7	4090298	Nut	1
8	4090281	Tube shaft	1
9	3090282	Screw rod	1
10	3090293	Lever	1
11	4090094	Spacer roll	2
12	3090284	Name plate	1
13	4090285	Holder pin 1", 1¼", 1½", 2", 28, 25, 42, 54mm	4
14	4090286	Holder pin ¾", 22mm	1
15	4090287	Holder pin 5/8", 18	1
16	4090288	Holder pin ½", 14-16	1
17	4090289	Holder pin 3/8", 12	1
18	4090290	Notcher tip ¾", 1", 1¼", 1½", 2", 22-54mm	10
19	4090291	Notcher tip 5/8", 18	2
20	4090292	Notcher tip ½", 14-16	2
21	4090099	Notcher tip 3/8", 12	2
22	4090258	Decal	1
23	3090297	Decal	1
24	9026111	Spring	1
25	9020111	Washer Ø30/Ø40x0.3	1
26	9028013	Handle	1
27	9018021	Pin Ø6m6x28	2
28	9018039	Parallel pin Ø8m6x20	3
29	9012014	Washer	1
30	9013014	Lock nut M12 8.8	1
31	9017209	Screw AB3,5x6,5	2
32	9016303	Lock screw M6x8 12.9	8
33	9014038	Screw M8x30 8.8	4
34	9014308	Screw M6x16	4

COLLARING MACHINE

14.5 NOTCHER ND-54 5090294



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