

## OWNER'S GUIDE

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### TORMACH TOOLING SYSTEM CNC OPERATOR'S SET

# TECHNICAL DOCUMENT

## PURPOSE

This document gives instructions on using the Tormach Tooling System CNC Operator's Set.

## PRODUCT INFORMATION

### Products:

- Tormach Tooling System (TTS) CNC Operator's Set: Inch (PN 32284)
- Tormach Tooling System (TTS) CNC Operator's Set: Metric (PN 32291)



Quantity	Description
<b>Tormach Tooling System (TTS) CNC Operator's Set: Inchs</b>	
2	<u>TTS Set Screw Holder: 3/8 in. (PN 31820)</u>
2	<u>TTS Set Screw Holder: 1/2 in. (PN 31821)</u>
6	<u>TTS ER Collet Holder: ER20 (PN 31829)</u>
2	<u>ER20 Collet: 1/8 in. (PN 30112)</u>
2	<u>ER20 Collet: 1/4 in. (PN 30120)</u>
2	<u>ER20 Collet: 3/8 in. (PN 30128)</u>
2	<u>ER20 Collet: 1/2 in. (PN 30598)</u>
1	<u>TTS Drill Chuck Arbor: JT1 (PN 31825)</u>
2	<u>TTS Drill Chuck Arbor: JT2 (PN 31826)</u>

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Quantity	Description
1	<u>Drill Chuck: 1/4 in. JT1 (PN 30102)</u>
2	<u>Drill Chuck: 3/8 in. JT2 (PN 30244)</u>
1	<u>30 mm Wrench for TTS-ER20 Nut (PN 30151)</u>
1	<u>22 mm Wrench for TTS-ER20 (PN 30106)</u>
1	<u>Tormach Tool Assistant Set (PN 31988)</u>
1	<u>Granite Surface Plate (PN 31713)</u>
1	<u>Anti-Seize (PN 31273)</u>
1	<u>TTS Tool Tray (PN 30302)</u>
1	3/16 in. Allen Wrench (PN 30473)
<b>Tormach Tooling System (TTS) CNC Operator's Set: Metric</b>	
2	<u>TTS Set Screw Holder: 6 mm (PN 31822)</u>
2	<u>TTS Set Screw Holder: 10 mm (PN 31823)</u>
2	<u>TTS Set Screw Holder: 12 mm (PN 31824)</u>
6	<u>TTS ER Collet Holder: ER20 (PN 31829)</u>
2	<u>ER20 Collet: 3 mm (PN 31056)</u>
2	<u>ER20 Collet: 6 mm (PN 31055)</u>
2	<u>ER20 Collet: 10 mm (PN 31054)</u>
1	<u>TTS Drill Chuck Arbor: JT1 (PN 31825)</u>
2	<u>TTS Drill Chuck Arbor: JT2 (PN 31826)</u>
1	<u>Drill Chuck: 1/4 in. JT1 (PN 30102)</u>
2	<u>Drill Chuck: 3/8 in. JT2 (PN 30244)</u>
1	<u>30 mm Wrench for TTS-ER20 Nut (PN 30151)</u>
1	<u>22 mm Wrench for TTS-ER20 (PN 30106)</u>
1	<u>Tormach Tool Assistant Set (PN 31988)</u>
1	<u>Granite Surface Plate (PN 31713)</u>
1	<u>Anti-Seize (PN 31273)</u>
1	<u>TTS Tool Tray (PN 30302)</u>
1	3/16 in. Allen Wrench (PN 30473)

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**Note:** If any items are missing, we can help. Email [support@tormach.com](mailto:support@tormach.com) to contact Tormach Technical Support for guidance on how to proceed.

## SAFETY

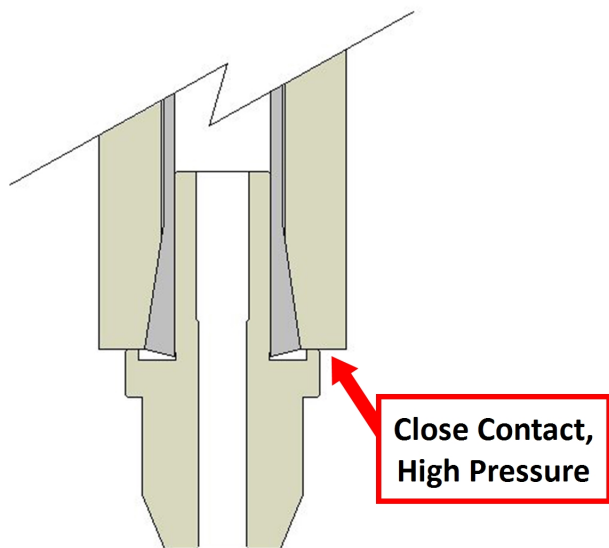
This document reviews the unique properties of the Tormach Tooling System (TTS) and provides some suggestions for operation.

You must be familiar with safe milling machine operations before attempting to use any milling machine. Tool holders by themselves are not dangerous, but the combination of a sharp cutting tool, a powerful machine, and an untrained or inattentive operator can be extremely dangerous. Users and operators are ultimately responsible for safe setup and operation.

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## PRINCIPLE OF OPERATION

Each Tormach Tooling System (TTS) holder has a shoulder that's undercut so it contacts the spindle itself, not the end of the collet.



*Figure 1: Tormach Tooling System (TTS) holder.*

As the drawbar is tightened, the collet simultaneously squeezes the shank and pulls upward into the spindle taper. This pulls the tool holder tightly against the spindle face. The final location, after tightening the collet, is exact, highly repeatable, and not affected by the variable tension of the drawbar or wear on the collet.

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## GENERAL OPERATING GUIDELINES

- Clean and degrease tool holders.
- Clean tools and collets before each use.
- Verify that tool holders and collets are dry when mounted.
- Remove any oil with alcohol and a clean cloth.

### Drawbar Tension

The drawbar tension necessary to avoid tool pullout varies with the work. Experienced operators quickly gain a feel for the torque needed. The worst case is usually a large spiral fluted high helix end mill, running under heavy load and vibrating while cutting. Without a very tight drawbar tension, Tormach Tooling System (TTS) can pull out under those conditions. In that sort of instance, we recommend as much as 25 to 35 ft lbs of torque on the drawbar. Under standard operating conditions, most people will tighten about 12 to 20 ft lbs of torque.

### Replacement

Both the drawbar and the collet are wear items. Examine the internal and external threads occasionally to make sure they're in good condition. A worn thread provides excessive friction in turning while under load, providing less pulling force on the collet for a given amount of torque on the drawbar.

Replace worn items as needed. A little grease on the threads will extend the life of both drawbar and collet.

## SET SCREW HOLDERS

Set screw holders are suitable for general milling operations and are intended to be used with end mills that have a Weldon flat on them. They can also be used with certain Silver & Deming style drill bits.

### Operating Tips

Verify that the set screw is on the flat of the tool, and never attempt to hold tooling without a flat. By nature, set screw holders will slightly push the end mill to one side of the clearance hole diameter when the screw is tightened. This offset from center is small, but significant for end mills smaller than 5/16 in. in diameter. Consider using an ER collet holder for small diameter tools and close tolerance finishing applications.

This is not significant in 1/2 in. and 3/8 in. tooling, but begins to become important on smaller cutters. The ER20 collet holders will mount tooling on center, without the offset inherent to a set screw holder. The ER20 collet holders are recommended if you are using 1/4 in. or smaller cutters that are based on a larger shank diameter, even if the shank offers a Weldon flat for mounting. The set screw holders will work for this application, but the tool will last longer and the machined finish will be better when using an ER20 holder.

### Install a Tool in a Set Screw Tool Holder

1. Clean the shank of the tool holder with a clean rag. Verify that the shank is free of any grease or oil.
2. Remove the set screw from the tool holder with a hex wrench.
3. Put the desired cutting tool into the tool holder.
4. Replace the set screw in the tool holder, and then completely tighten it with a hex wrench.

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## JACOBS TAPER AND DRILL CHUCKS

Jacob's taper adapters are used for mounting drill chucks.



*Figure 1: Jacobs taper adapter and drill chuck.*

Drill chucks aren't designed to support side loads and should never be used to hold end mills or any other side cutting tools. The vibration, in combination with side loads from a milling operation, will generally shake the drill chuck off the mount.

### Install a Drill Chuck in a Jacobs Taper Arbor

1. Assemble the drill chuck on to the Jacobs taper arbor:
  - a. Use a clean rag and acetone to clean the taper and socket. Verify that the taper and socket are both free of any grease or oil.
  - b. Retract the jaws: fully open the drill chuck.
  - c. Use a dead-blow hammer (or similar) to seat the drill chuck on the Jacobs taper arbor.
2. Put the drill into the drill chuck.
3. Depending on the type of drill chuck, do one of the following:
  - **Keyless Drill Chuck** Tighten the drill chuck by hand.
  - **Keyed Drill Chuck** Use a chuck key to tighten the drill chuck until it is finger tight.

### Remove a Drill Chuck

To reuse a chuck that's mounted on a different taper adapter, you must use a long punch and vise.

1. Set the chuck on top of a vise with the taper adapter pointing down. When the chuck jaws are fully open, the small circular part you will see in the center, down inside the chuck, is actually the end of the taper adapter.



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2. Put a rag (or other protective material) below the chuck to catch the taper adapter.

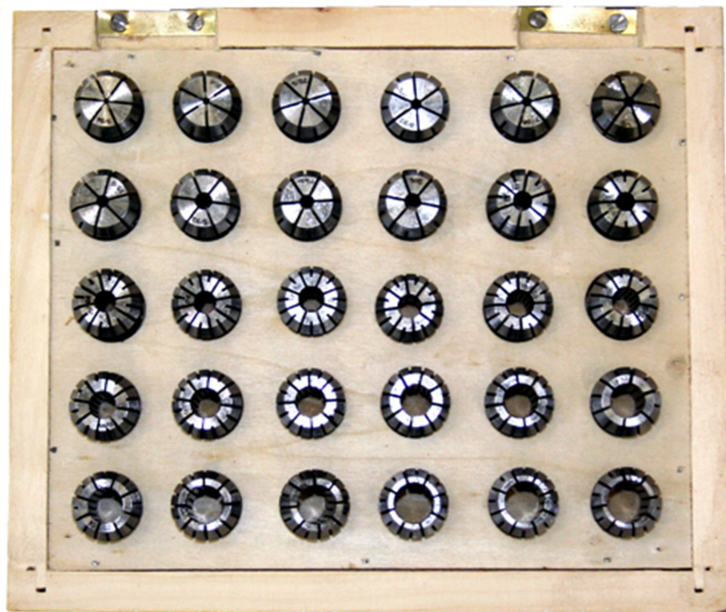
**NOTICE!** If the adapter is dropped onto a concrete floor, it's likely that the ground surfaces of the adapter will become damaged.

3. Using a punch placed directly in the center, drive the punch with a good sharp hammer blow and the taper adapter should drop free.

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## ER20 TOOL HOLDERS

ER20 holders are suitable for milling and drilling operations.



*Figure 1: ER20 tool holders.*

ER20 holders center the tool spindle. They're desirable for operations requiring a high degree of concentricity: drilling, reaming, precision finishing, etc. Choose the correct collet size for the tool; collets are available in both inch and metric sizes.

### Install a Tool in an ER Collet Tool Holder

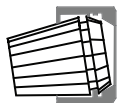
The ER20 collet is self-extracting: the collet must be mounted in the nut before the nut and collet assembly are put into the collet holder.

If you look closely, you'll notice that the collet nut isn't symmetrical — an area of the retaining ring is cut away. When the collet is correctly mounted in the nut, the collet is pushed forward and out of the collet holder taper while the nut is slightly loosened (which results in self-extraction).

**NOTICE!** If you don't install the collet in the order specified, there's a risk that the collet and/or nut could be damaged, and the collet's holding capacity could be reduced.

To install a tool in an ER collet tool holder:

1. Hold the collet at an angle, and then insert it into the collet nut as shown in the following image.



*Figure 2: A collet inserted into the collet nut.*

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2. Tilt up the collet to snap it into place.



***Figure 3: The collet tilted into place.***

3. Loosely thread the nut on the tool holder, insert the tool, and then tighten the collet.