



Enabling Your Ideas

Technical Document

Tormach Tooling System® CNC Operator's Set

Product Identification:

- TTS® CNC Operator's Set – Inch (PN 32284)
- TTS CNC Operator's Set – Metric (PN 32291)

NOTE: Parts list varies for each; see tables below.

Purpose: This document details use of the Tormach Tooling System CNC Operator's Set.



Qty.	TTS CNC Operator's Set (Inch)	PN
2	TTS-3/8" Set Screw Tool Holder	31820
2	TTS-1/2" Set Screw Tool Holder	31821
6	TTS-ER20 Collet Holder	31829
2	ER20 Collet – 1/8"	30112
2	ER20 Collet – 1/4"	30120
2	ER20 Collet – 3/8"	30128
2	ER20 Collet – 1/2"	30598
1	TTS-JT1	31825
2	TTS-JT2	31826
1	1/4" Drill Chuck – JT1	30102
2	3/8" Drill Chuck – JT2	30244
1	30 mm Wrench	30151
1	22 mm Wrench	30106
1	8" Digital Height Gauge w/ Cable	31988
1	Compact Granite Surface Plate	31713
1	TTS-R8 Adaptor Collet	35356
1	Anti-seize Grease	31273
1	TTS Tool Tray	30302
1	3/16" Allen Wrench	30473

Qty.	TTS CNC Operator's Set (Metric)	PN
2	6 mm Set Screw Tool Holder	31822
2	10 mm Set Screw Tool Holder	31823
2	12 mm Set Screw Tool Holder	31824
6	TTS-ER20 Collet Holder	31829
2	ER20 Collet – 3 mm	31056
2	ER20 Collet – 6 mm	31055
2	ER20 Collet – 10 mm	31054
1	TTS-JT1	31825
2	TTS-JT2	31826
1	1/4" Drill Chuck – JT1	30102
2	3/8" Drill Chuck – JT2	30244
1	30 mm Wrench	30151
1	22 mm Wrench	30106
1	8" Digital Height Gauge w/Cable	31988
1	Compact Granite Surface Plate	31713
1	TTS-R8 Adaptor Collet	35356
1	Anti-seize Grease	31273
1	TTS Tool Tray	30302
1	3/16" Allen Wrench	30473

NOTE: If any of these items are missing, contact Tormach Customer Service at (608) 849-8381 for a replacement.

Safety

This document reviews the unique properties of the Tormach Tooling System (TTS) and provides some suggestions for operation. Machine operators should be versed in 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.

Principle of Operation

Each TTS holder has a shoulder that is undercut so it contacts the spindle itself, not the end of the collet (see **Figure 1**). As the drawbar is tightened the collet will simultaneously squeeze the shank and be pulled 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.

General Operating Guidelines

Clean and degrease tool holders. Clean tools and collets before each use. Tool holders and collets should be 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 TTS can pull out under those conditions. In that sort of instance we would 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

Be aware that both the drawbar and the collet are wear items. Check the internal and external threads occasionally to make sure they are in good condition. A worn thread will provide 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 and remember that a little grease on the threads will extend the life of both drawbar and collet.

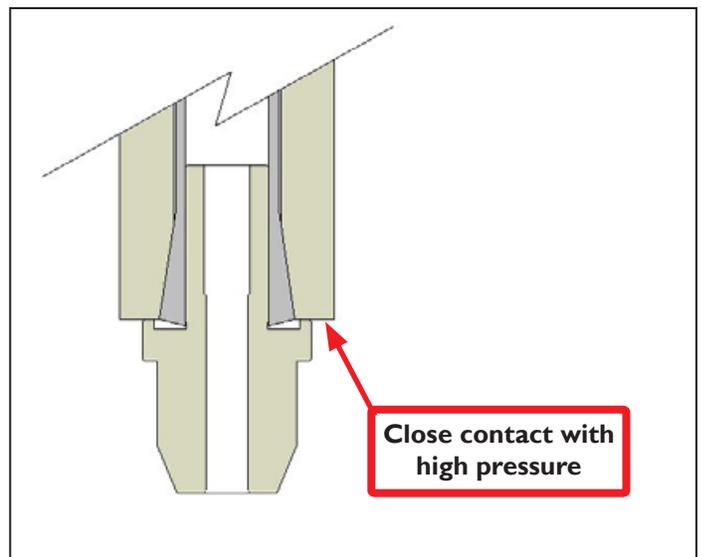


Figure 1

Set Screw Holders

Overview

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

Make certain 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 diameter. Consider using an ER collet holder for small diameter tools and close tolerance finishing applications.

This is not significant in 1/2" and 3/8" 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" 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.

Jacobs Taper and Drill Chucks

Overview

Jacob's taper adaptors are used for mounting drill chucks (see **Figure 2**). Drill chucks are not 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.

Installing a Drill Chuck

Mounting a chuck on a taper adaptor is a simple matter of pushing the adaptor onto the chuck. It is important to remove any oil or grease on both the taper adaptor and the socket in the chuck before putting them together. Use a cotton swab and a little rubbing alcohol to degrease each end (see **Figure 3**). Heating the chuck and/or cooling the taper adaptor before putting them together can provide a more secure connection. Achieve this with a halogen desk lamp held over the chuck until it is quite warm. The heating technique is not necessary, but it does help the connection resist vibration.



Figure 2



Figure 3

Removing a Drill Chuck

To reuse a chuck that is mounted on a different taper adaptor, a long punch and vise are required. Set the chuck on top of a vise with the taper adaptor 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 adaptor. Using a punch placed directly in the center, drive the punch with a good sharp hammer blow and the taper adaptor should drop free. Be prepared with a rag or something below the chuck in order to catch the taper adaptor. The ground surfaces of an adaptor are likely to be damaged if it is dropped onto a concrete floor.

ER 20 Tool Holders

Overview

ER20 holders (see **Figure 4**) are suitable for milling and drilling operations. They will center the tool spindle and are desirable for operations requiring a high degree of concentricity: drilling, reaming, precision finishing, etc. Make sure to choose the correct collet size for the tool; collets are available in both inch and metric sizes.

Operation

The ER20 collet is self-extracting, meaning the collet must be mounted in the nut first, before the nut and collet assembly are put into the collet holder. If these steps are not taken, the collet and/or nut may be damaged and collet-holding capacity reduced. A close inspection of the collet nut reveals it is not symmetrical. An area of the retaining ring is cut away. With the collet held at an angle, tip it into the cut-out area (see **Figure 5**) and snap it into place (see **Figure 6**). With the collet correctly mounted in the nut, the collet is pulled forward and out of the collet holder taper when the nut is slightly loosened, resulting in self-extraction.

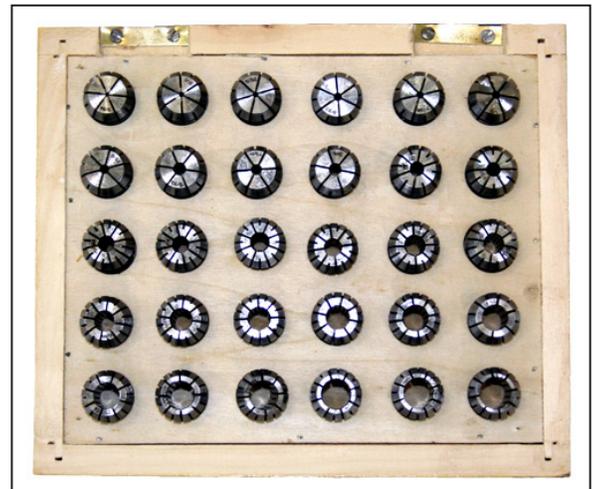


Figure 4

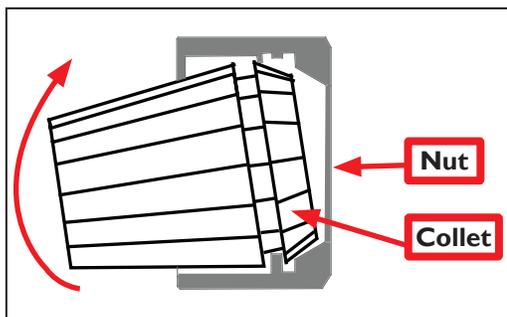


Figure 5

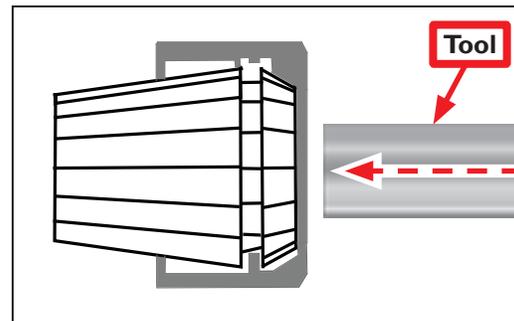


Figure 6