# TAPPING HEADS

Part Numbers: 30612, 30613, 31163

## OVERVIEW

Tormach offers both reversing and tension/compression tapping heads suitable for use with the PCNC 1100 or any other machine capable of accepting a ¾" shank. Both types have a TTS (Tormach Tooling System) mount for quick manual tool changes for any machine with R8 or Morse spindle taper.

The reversing head (Figure 1) comes in two sizes, small and large. The Small Tapping Head (PN 30613) covers #0 to ¼" (M2-M7) taps and the Large Tapping Head (PN 30612) ranges from #8 to ½" (M4-M12).

The Tension/Compression Tapping Head (PN 31163, Figure 2) is a modular tool holding system consisting of a tapping chuck and 9 quick-change collets. It is compatible with ANSI inch taps (#0 – ½") and metric taps (M1.6-M12.5). The float in the tapping head is approximately 0.75 in (+0.25/-0.50 in. tension/compression). Both the chuck (PN 31162) and the collets (PN 31164-PN 31172) can also be purchased individually as replacements or extras.

*Fig. 1.* Reversing Tapping Head

## BACKGROUND

Effective tapping requires synchronization of the spindle speed with feed rate. For a given spindle RPM, the corresponding feed rate is determined by the thread pitch of the tap. If not synchronized, the tap will not cut in a true helical path and will double cut or damage the threads and possibly break.

A tap will spin faster or slower as it engages more or less material. The effect is especially noticeable when the tap enters or exits the hole. Additionally, the acceleration and deceleration of both the axes and spindle drive systems in CNC mills will affect synchronization, especially when the tap reverses direction. For this reason, a method is needed to allow the tap to adjust position as it threads.

For small holes, there are three tapping methods:
A) Reversing Tapping Head
B) Tension/Compression (or floating) Tapping Head
C) Rigid Tapping

Both Reversing and Tension/Compression Tapping heads are built with vertical compliance, or float, to aid in maintaining the desired thread pitch as the spindle RPM fluctuates, greatly improving the quality of the threads.

- A Reversing Tapping Head uses an internal gear/clutch mechanism to 1) provide float, and 2) reverse rotation when the head withdraws. They are more complicated mechanically, but are simpler to program.

*Fig. 2.* Tension Compression Tapping Head


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• A Tension/Compression tapping head has a built-in spring mechanism that allows the head to float to adjust the position of the tap as needed. Programming is slightly more complex, but they are considered robust and highly reliable. The spindle drive system must also be able to quickly accelerate and decelerate.

• Rigid tapping uses specialized spindle control with feedback to very accurately maintain feed rate - spindle speed coordination. Its typically found on expensive mills and dedicated holemaking CNC centers. Rigid tapping is not feasible on mills without sophisticated and specialized spindle control.

| Technical Specifications - Reversing Tapping Heads | | |
|---|---|---|
| PN | 30612 | 30613 |
| Mount | TTS | TTS |
| Tapping Range | #8-1/2" (M4-M12) | #0-1/4" (M2-M7) |
| Maximum Speed | 1000 RPM | 1500 RPM |
| Forward Ratio | 1:1 | 1:1 |
| Reversing Ratio | 1:1.75 | 1:1.61 |
| Downstroke Compression | 0.197" | 0.197" |
| Clutch | 0.16" | 0.14" |

| Technical Specifications Tension/Compression Tapping Head | |
|---|---|
| PN | 31163 |
| Mount | TTS |
| Tapping Capacity | M1.6 to M12 (#0 to 1/2") |
| Tension Float | Approx. 0.25" |
| Compression Float | Approx. 0.50" |

## SYSTEM REQUIREMENTS, REVERSING TAPPING HEADS

No special requirements.

## SYSTEM REQUIREMENTS, TENSION/COMPRESSION TAPPING HEADS

Tormach recommends the Tension/Compression Tapping Head only for use with the PCNC 1100 Series II machine or Pre-Series II machines that have been upgraded with the spindle upgrade kit, (PN 31090). Tormach owners should also confirm they have the correct control software installed. For Series II owners and Spindle Upgrade Kit owners, consult our website at www.tormach.com.

| Spares & Replacements - Tension/Compression Tapping Head | | |
|---|---|---|
| PN | Inch Taps | Metric Taps |
| 31164 | #0-#6 | M1.6-M3.5 |
| 31165 | #8, 5/32" | M4 |
| 31166 | #10, 3/16" | M4.5, M5 |
| 31167 | #12, 7/32" | |
| 31168 | ¼" | M6, M6.3 |
| 31169 | 5/16" | M7, M8 |
| 31170 | 3/8" | M10 |
| 31171 | 7/16" | M11 |
| 31172 | ½" | M12, M12.5 |
| 31162 | Replacement Tension Compression Tapping Chuck | |

For other non-Tormach machines, verify that commanded spindle speed is in line with what is measured before proceeding by using a tachometer, such as PN 30527. When in doubt, consult with the machine manufacturer.