Setup Guide - TMA Autochanger

air turbine spindles®

Air Hoses, Fittings, Air Compressors - CFM / L/S, PSI / Bar Requirements

Please read all instructions before setting up to run the *Air Turbine Spindles*® and optional adjustable TMA Autochanger - In addition refer to usernotes at www.airturbinetools.com.

- Do not connect air to your spindle until installation is complete.
  Spindle will turn on as soon as air reaches turbine motor.

- Never turn on main spindle, or hit button on control panel FWD/REV, while ATT spindle is loaded!

- Plumb or buy a new dedicated clean air line with a ½" / 7.5mm minimum Internal Diameter and a swedged-on fitting of the same diameter to the back of the machine where the 0.3 micron Filter/Regulator will be mounted to supply your ATT spindle. Use magnets for temporary mounting. *Air Turbine Spindles*® supply a Filter/Regulator and a hose to reach the Filter/Regulator as standard equipment in your spindle case. Avoid fittings with smaller internal diameters than stated on page 6, in the interior because these will restrict airflow to your spindle.

- Buy a **manual shut off valve** (or two) and install on your hose line in either before or after the ATT Filter/Regulator.

- If using TMA autoloading option and you are not using supplied TMA mounting block, remove the threaded air tip (Nozzle) from collar and hook up the air line directly to the NPT hole with supplied Quick Connect (Push On) hose fitting.

- Ensure plug is in place if air inlet is not in use. Supply the *Air Turbine Spindles*® with sufficient **compressed air pressure** at 90 to 100 psi / 6.2 - 7.0 bar and sufficient **CFM / L/S rated in the catalog/online**.

  If while running the ATT spindle you observe a drop in the pressure (i.e. below 90 PSI / 6.2 Bar), then you may not have enough CFM / L/S output from your compressor (see more notes under CFM / L/S & Fittings). Falling under 90 psi / 6.2 bar will cause severe drop in power and rpm of your spindle. The solutions are addressed below.

- Use a flow meter to check CFM / L/S airflow going to your *Air Turbine Spindles*® if in doubt.

- Consult cutting tool supplier for an appropriate selection of speed rated cutting tools. Avoid long stick out from collet. Smaller size cutting tools optimize performance at high speed with a light pass at a high rate of advance.

- Always use solid pull stud.

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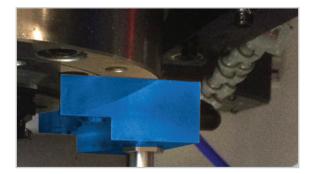## Set Up and Operation of Air Turbine Spindles® with TMA Autochanger Option

- Install compressed Air Filter / Extractor/ Regulator (AFER) with at least 0.3 micron extraction A Filter / Extractor is provided with each Spindle. Please set regulator at correct <u>90 PSI / 6.2 Bar.</u>

- Install in-bound shop air to AFER with shut off valve (see example photos below).

Shut Off Valve
(Switch to off position during setup)

Set Regulator
90 psi / 6.2 bar

Photos of customer supplied "shut-off" valves. Ensure internal diameter meets specifications (see page 1).
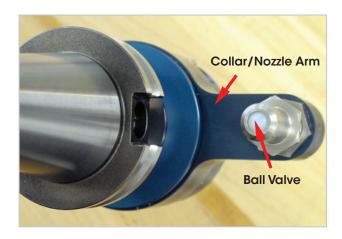
- Shut off all air flow or remove hose from regulator at this time so that no compressed air reaches your Spindle. WARNING: ATT spindle will turn on as it loads into spindle with air on!

- Never assume the TMA Nozzle will clear all portions for CNC Tool changer guarding or machine columns. Consult CNC machine manufacturer drawings and / or verify all clearances via mock up tool. Dimensions of each *Air Turbine Spindle®* and TMA may be found in your catalog or online at www.airturbinetools.com.

- Install ATT supplied Spindle Mount Block.

- Prepare CNC spindle by performing M19.
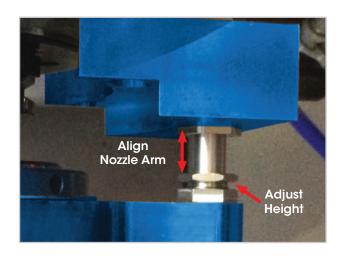
Collar/Nozzle Arm

Ball Valve

Alignment of drive dogs with TMA Mounting Block

Observe the position of drive dogs in machine's main spindle (while at spindle orient) and rotate *Air Turbine Spindles*® collar / nozzle arm to align with Spindle Mount Block. In this example, drive dogs are aligned directly with Nozzle inlet on block, so this makes it easy to set (see photo).

Screw TMA Nozzle into threaded collar tapped hole. Adjust the correct length to connect with the mounting block on your CNC machine (you may need to loosen lock nut). An extension block may be required if the distance is greater than the nozzle length.

Note: Once the *Air Turbine Spindles*® is loaded into main spindle, you may need to raise this Nozzle more to engage the ball valve seal, which starts air flow. The air flow will turn on *Air Turbine Spindles*® . spindle in a few seconds.

Align Nozzle Arm

Adjust Height

Load *Air Turbine Spindles*® carefully into CNC spindle with left hand while holding Tool Release button on CNC machine. Some trial and error may be needed, but do not let main spindle drawbar (tool release button) start unless Connector Nozzle goes up into block Inlet hole (approximately ¼" / 6mm up into inlet hole).

If Nozzle Arm is misaligned from inlet, remove from CNC spindle taper area and adjust clocking of TMA Nozzle to properly align with inlet hole and re-try loading procedure.

Once successfully loaded into CNC machine spindle, turn on air hose shut-off valve or install air hose to filter / regulator. If spindle turns on and sounds good, then Connector Nozzle can be presumed to be set at correct height.

If ATT spindle does not turn on, then begin procedure to raise height of nozzle using proper open end wrenches. Turn hex on nozzle counter-clockwise to raise up the Nozzle. **Use caution with Hands and any clothing that may be next to cutting tool in ATT collet nose because the spindle will turn on and begin rotating at rated rpm when air is supplied.** Once *Air Turbine Spindles*® spindle turns on, raise the Nozzle another small amount and then lock the hex lock-nut to secure the Nozzle in place.

If the Nozzle is too high, you will see the blue spindle collar tilt or cock. This may loosen the bottom lock in the spindle collar or allow excessive air to become released from the collar O-rings which seal the TMA collar to the main flange portion of the TMA collar system.
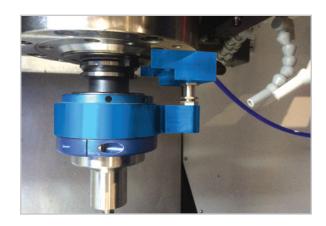
If too high, reverse procedure to lower the Nozzle re-tighten the lock-nut so the connector is an accurate fit.

If spindle collar does not rotate, loosen the collar by adjusting hex nuts in spindle collar so that the rotation is free at a light pressure but not loose.

Air Turbine Technology, Inc's TMA collar and nozzle are patent pending developments.

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Example: Model 650 Spindle loaded into CNC machine spindle. Normally one should perform a tool change (i.e. with override set to lowest speed) several times to observe the loading and unloading of the ATT spindle and ensure it engages and operates correctly.

Instructions & Warnings for safe running of ATT spindles by all personnel

Also refer to user notes, safety instructions, cnc manufacturer/program manual, and local regulations.

G-Codes/Spindle Orient - It is an important safety precaution to ensure Set up personnel, Machine operators, Programmers, etc. are all properly notified that the main spindle must remain stationary, except while CNC machine is doing a Tool Change. During a tool change after loading the ATT spindle the CNC spindle normally does a spindle orientation or rotation to ensure the drive dogs are aligned prior to loading into Tool changer drum or sidemount mechanism. The ATT "TMA" option allows a spindle orientation due to its patent pending collar system.

TMA Collar Rotation - A factory set level of resistance (i.e. collar with plunger section to spindle body section) keeps the Plunger in place during a tool change, while still allowing the free rotation (i.e. spindle orient). Over time this friction may change due to coolant, lubrications, dust, etc., so ensure there is not too much friction or too little, as this may cause mis-loading of spindle. Tightness of collar may be adjusted using hex keys, if necessary, so it remains free to rotate but remains in place.

Canned Cycles - Beware that on some CNC controls the G81, G82, G83 (peck drilling) commands may turn on the machine spindle, even with M05 (spindle stop) and not spindle command in the code (i.e. S0 M03)

Spindle Commands - Use M05 on Fanuc type controls to ensure spindle is turned off

Dry Run, Graphic Run - Always run the CNC machine program in Graphics and/or in a slow dry run to verify the CNC spindle does not turn on.

Parameters to disable CNC Main Spindle RPM - Some CNC machine controls have specific parameters to allow "0" rpm, which can ensure no rpm is possible via control or program.

Setting Tool Length - With *Air Turbine Spindles*® loaded in CNC machine spindle: use small pin or known tool shank to roll under tool in collet of ATT spindle as you jog down (once close use 0.001 or 0.0001″ increments). Alternatively, tool setting via probes is possible with Drill type of macro cycle (i.e. this will not turn on main CNC spindle).