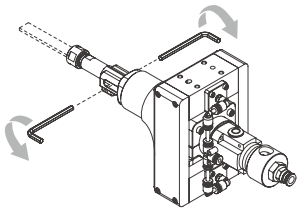
Mindman **TAF20 series**

SERVICE MANUAL

Angular Compliant Deburring Tool For Robot

① Without file
② File removal and installation



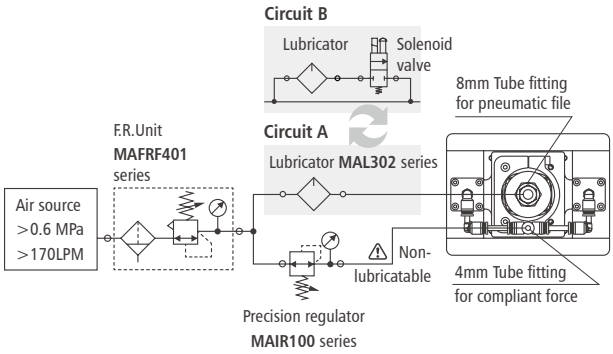
⚠ Cautions

① This product is designed exclusively for deburring workpieces with a robot, any other use is not intended.
② Do not close to the robot when it operates in automatic mode.
③ Files and burrs can hurt, beware when you are working with them.
④ Files and compliant tools can be damaged by collision, check robot paths before automatic operation.
⑤ Severe bouncing of the file on the workpiece can damage compliant tools, check it before automatic operation.
⑥ Do not lubricate the precision regulator and the air for the compliant force, lubricant may cause malfunction of them.
⑦ Never allow contact with the workpiece from a direction that is not aligned with the compliant module's direction.
⑧ The noise from grind could damage your hearing, be sure to always wear earplugs at work.

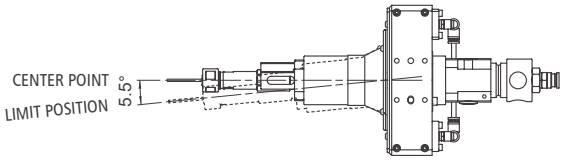
Before Use

① Prepare a suitable air source as illustrated below.

* If excessive oil injection occurs, it is recommended to reduce the lubricant amount in **circuit A** or refer to **circuit B** to add an oil circuit switch to set the oil injection interval. Adjust as needed to avoid excess dripping.



② Check the CENTER POINT of the spindle first. Giving 0.2 MPa to the compliant force while the spindle is turned off. Check the spindle is able to return to the CENTER POINT. If it doesn't return or is not on the CENTER POINT (*1), please contact us.

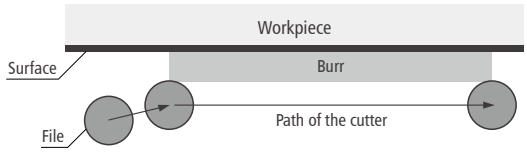


③ While the spindle is on the CENTER POINT, turn it on and listen to the high frequency sound. If there is any other lower frequency or noise that makes the sound not pure and clear or the spindle doesn't operate smoothly, please contact us.
④ Install the compliant tool on the robot or a fixed point through the screw holes and pin holes (*2).
⑤ Setup TCP (Tool Center Point) of the compliant tool in the robot controller. You can use either designed dimensions or the four point calibration method (*3).
⑥ You have finished the preparation, now you can start teaching-in paths of the robot.

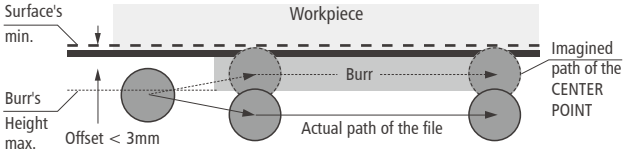
*1. The CENTER POINT may not align exactly with the position shown in the illustration. A tolerance or gap of less than 0.5 mm is considered normal.
*2. Dimensions of tools are in the Appendix. If you need 3D model or 2D drawing, please download from website. www.mindman.com.tw
*3. We suggest using designed dimensions at the beginning and four point calibration method to improve TCP accuracy. When you implement the four point calibration method, you will need a dummy sharp tip to indicate the point that you are interested in.

Teach-in Robot Path

① Let the spindle be on the CENTER POINT and move the workpiece or the spindle along each other (*1). Teach-in a path that makes the acting point on the file always contacts with burrs to be removed.



② Set an interference distance along the path you just taught-in in the previous step. This interference distance is to prevent non-contact between the file and the workpiece, and also offers a stable contact force(compliant force). The key of setting interference distance is to imagine the path of the CENTER POINT while you could only see the actual path of the pneumatic file. Interference distance should be set smaller than 3mm to prevent the compliant tool from collision.



③ If it's impossible to set an interference distance smaller than 3mm due to a large burr, several paths over the same segment are required. To do so, the imaged paths of the CENTER POINT are closer to the final position each time.
④ If the robot path curves, use more points than in a straight path. Speed down the robot when the burr is large and up when it's small. Before actual deburring operation, make sure the path is smooth.

*1. Both workpiece or tool on hand are possible, it depends on the aspect of system integration.

Operation

① Set the pressure of the compliant force small, for example 0.2 MPa, and operate the deburring process.
② If burrs are not fully removed, increase the compliant force. If only certain areas have residual burrs, reduce the robot arm speed along those specific segments. If the cutting is too deep, lower the compliant force or increase the robot arm speed.
③ If the file bounces on the workpiece, this is because the compliant force is too small. Either tune up the compliant force or speed down the robot can solve this problem.
④ If the file is blocked during operation, it may have some mechanical issue or lack of lubrication. Though it's quite rare, the material removal rate may be too high. Either tune down the compliant force or speed down the robot can solve this problem.

Maintenance

① **Daily** Check the file for damage or wear, replace it if necessary. Check air conditions and keep it dry, clean and lubricated.
② **Weekly** Check that the spindle operates smoothly and without abnormal noise. Verify that the compliant stroke moves smoothly and can return to the CENTER POINT. When at the CENTER POINT, the mechanical play of the spindle should be less than 0.5 mm when lightly shaken by hand, and it should be able to reach both forward and backward LIMIT POSITIONS. If any defect is found, please contact us.

Specification

Compliant angle	(°)	±5.5 (planary)
Compliant force	(N)	6～15
Nominal operating pressure	(MPa)	Compliant force: 0.2～0.5, pneumatic file: 0.6
Air source requirement		> 0.6 MPa, clean, dry, filtered ≤ 5μm
Air consumption	(LPM)	Compliant force: neglectable Pneumatic file: 170
Recomm. lubricating oil (*)		Turbine oil ISO-VG32
File idle frequency	(BPM)	5000
Frequency	(mm)	10
File shank diameter	(mm)	ø6 / File
Ambient temperature	(°C)	+5～+35
Ambient moisture	(%)	<95
Weight	(kg)	2

* Only for the pneumatic spindle. Adjust oil quantity as needed.