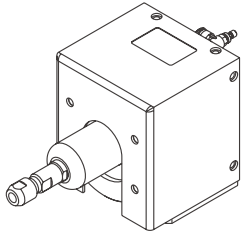




SERVICE MANUAL

Pneumatic Spindle - Linear Compliant Deburring Tool



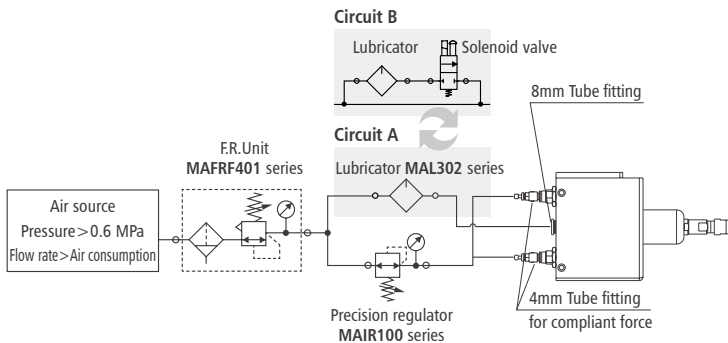
⚠ Cautions

- ① This product is exclusively designed for robot deburring work, DO NOT use for other purpose.
- ② For your safety, DO NOT approach the robot when it is in automatic operation mode.
- ③ Grinding tools and burrs could cause injuries, be aware when you are working with them.
- ④ Collisions may cause damage to the compliant module. Be sure to thoroughly check before running in fully automated mode.
- ⑤ The air supplied to the precision regulator and the compliant force should NOT be lubricated, otherwise the compliant module will be damaged.
- ⑥ The noise from grind could damage your hearing, be sure to always wear earplugs at work.
- ⑦ Never allow contact with the workpiece from a direction that is not aligned with the compliant module's direction.

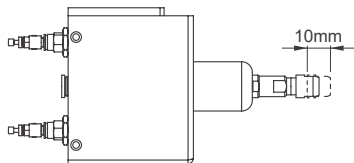
Before Use

- ① Prepare a suitable air source as shown as the illustration below. The maximum flow rate of the thick lines should exceed the air consumption of the spindle.

* 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 Supplying air pressure to the 4mm fitting will extend the TLG40, as shown in the diagram below.



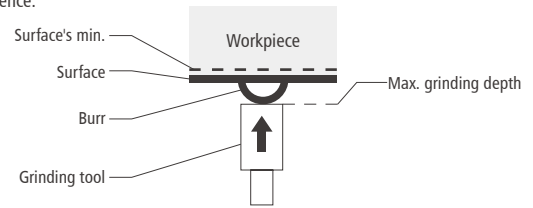
- ③ Turn the spindle on and listen to its high frequency sounds. If there are any other low frequency sounds, or if the spindle doesn't run smoothly, please contact your supplier.
- ④ Install the compliant tool on the robot or a fixed position by screw holes and pin holes. (*1)
- ⑤ Setup TCP (Tool Center Point) of the compliant tool in robot controller by using either designed dimensions or the four-point calibration method. (*2)
- ⑥ You have finished the pre-use preparation, now you can start teaching-in robot paths.

*1. Please contact your supplier for 3D and 2D drawings of the compliant module, or download them from our website: www.mindman.com.tw

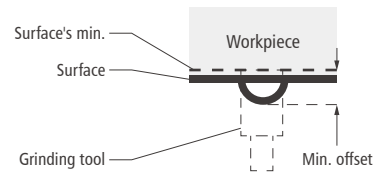
*2. It is recommended to start by using designed dimensions in the first place and then using four-point calibration method to improve the accuracy of TCP. When you implement the four-point calibration method, you need to indicate the point of TCP that you want with a sharp dummy tip.

Teach-in Robot Path

- ① Keep the compliant tool fully extended, then teach-in the robot path so that the tool tip touches where needs to be grinded on the workpiece (*), ensuring it makes contact without interference.



- ② Add an offset (virtual cutting depth) to the previously taught-in point. The purpose of setting this offset is to prevent the grinding tool from losing contact with the workpiece and to provide a stable contact force. This offset should be able to absorb all dimensional errors and the grinding depth, but it should not be set too large, to avoid hitting the stroke limit.



- ③ The compliant tool's axial direction must be aligned with the surface normal of the workpiece to achieve the best grinding results.
- ④ When the TLG40 contacts the workpiece, it should only move axially (forward and backward). Lateral movement is not allowed, as lateral forces can damage the spindle and floating mechanism.

* Both workpiece or tool on robot are possible, depends on the aspect of system integration requirement.

Operation

- ① Set the compliant force to a small value, such as 0.2MPa, then start operating the deburring process.
- ② Increase the compliant force or the robot dwelling time, if the burrs were not completely removed.
- ③ If the spindle is blocked during operation, it may be caused by the high material removal rate. Reduce the compliant force will solve this program.

Maintenance

- ① **Daily** Check whether the deburring tip is damaged or wore, replace it immediately when it has been invalid. Drain the water cup if it is full. Check the lubricating oil drip rate is normal.
- ② **Weekly** Ensure the spindle operates smoothly without weird noises. Make sure compliant tool moves smoothly and can reach limit positions. If you notice any mechanical issues, please contact your supplier.

Specification

| Model | | TLG40 |
|-----------------------------|-------|--|
| Compliant stroke | (mm) | 10 (one-sided) |
| Compliant force | (N) | 26 ~ 66 |
| Operating pressure | (MPa) | Compliant force: 0.2~0.5 Spindle: 0.6 |
| Air source requirement | | > 0.6 MPa, clean, dry, filtered ≤ 5μm |
| Air consumption | (LPM) | Compliant force: Ignorable Spindle: 450 |
| Recomm. lubricating oil (*) | | Turbine oil ISO-VG32 |
| Spindle type | | Vane motor |
| Spindle type speed | (rpm) | 22000 |
| Collet size | (mm) | 6 |
| Ambient temperature | (°C) | +5~+35 |
| Ambient humidity | (%) | <95 |
| Weight | (kg) | 3.7 |

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