Compliant Deburring Tool for Robot

User's Quick Guide

LRC300(S, M, L)

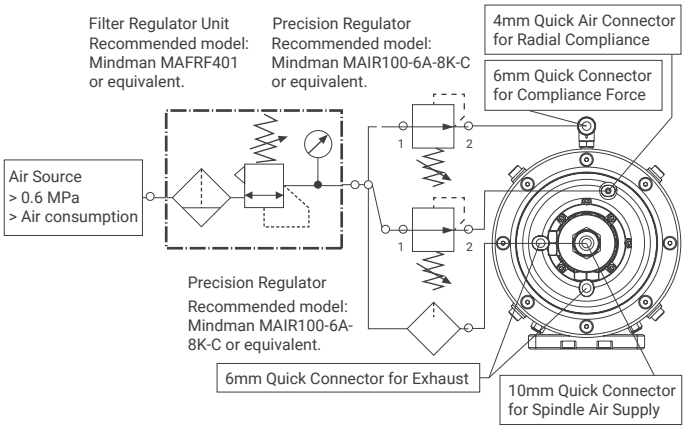
Website Youtube

Maintenance

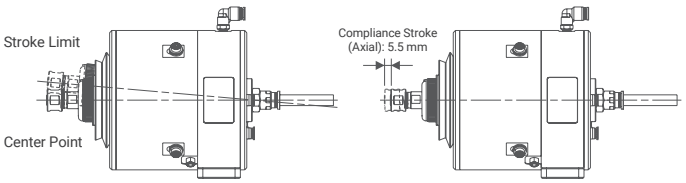
1. **Daily:** Check whether the grinding tool is damaged or wore, replace it immediately when it has invalid. Check air conditions and make sure the filter cup is not full of water, drain it in time. Check the lubricating oil drip rate is normal.
2. **Weekly:** Ensure the spindle operates smoothly without weird noises. Make sure compliant tool movements work smoothly, and the spindle is able to return to the CENTER POINT. Shake the spindle gently by hand at the CENTER POINT, and the mechanical gap should be less than 0.5mm. The spindle should be able to reach both forward and backward LIMIT POSITION. If any defect is discovered, please contact your supplier.

Before Use

1. Prepare a suitable air source as shown in the diagram below. The maximum flow rate of the air supply line must be greater than the air consumption of the tool. For LRC300S, M, and L, refer to the appearance dimension diagram for details. The spindle air source uses a 10mm outer diameter pneumatic tube, and the compliance air source uses a 6mm quick connector.



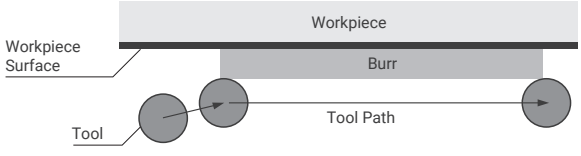
2. Check the CENTER POINT (*1) first; giving 0.2 MPa pressure to the compliant force connector while the spindle is turning off. Make sure the spindle is able to return to the CENTER POINT as shown as the illustration below. Please contact your supplier if it couldn't return to or is not on the CENTER POINT.



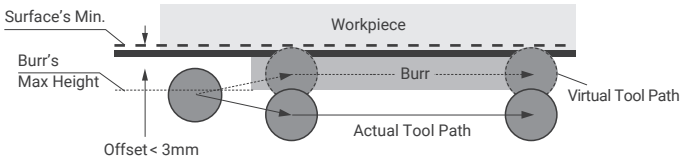
3. Turn the spindle on when it is on the CENTER POINT, and listen to its high-frequency sounds. If there are any other low-frequency sounds or noises, or if the spindle doesn't rotate or is not smooth, please contact your supplier.
4. Install the compliant tool on the robot or a fixed position by screw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

Path Teaching Guidelines

1. Radial Direction: Move the spindle back to the center point, then move the spindle along the workpiece (*4). Teach a path where the deburring tool (tungsten carbide burr) stays in contact with the burrs or the areas to be grinded. Axial Direction: Keep the compliance tool fully extended, then teach robot points where the grinding tool just contacts the workpiece.



2. Add a depth offset to the point taught in the previous step. The purpose of this offset is to ensure that the compliance tool maintains contact with the workpiece. Therefore, the offset should be greater than all dimensional errors, including the depth that needs to be ground, but it should not exceed 3mm, which is the limit of the compliance stroke.



3. If the burrs are too high and the offset cannot be less than 3mm, it may be necessary to repeat the action along the corresponding path several times, gradually bringing the virtual cutting depth closer to the final target.
4. If the robot's path is curved, more waypoints should be used compared to straight paths. When burrs are large, reduce the robot's speed; conversely, increase the speed when burrs are smaller. Before performing the deburring process, ensure the robot's path is smooth.
5. When the tool contacts the workpiece, the robot can perform axial forward and backward movements, as well as radial angular displacements simultaneously.

Operation

1. Set the compliance force to a lower value, such as 0.2 MPa, then activate the spindle air supply and execute the robot path.
2. If the burrs are not completely removed, increase the compliance force. If some burrs remain, reduce the robot speed along the unfinished segments. If the cutting depth is too much, lower the compliance force or increase the robot speed.
3. If the tool bounces on the workpiece, it's because the compliance force is too low. Increase the compliance force or reduce the robot speed to resolve this issue.
4. If the spindle noticeably slows down or becomes blocked during operation, it may be caused by a high material removal rate. Reducing the compliance force will solve this problem.

Cautions

1. This product is exclusively designed for robot deburring work, DO NOT use it for other purposes.
2. For your safety, DO NOT approach the robot when it is in automatic operation mode.
3. Tips and burrs could cause injuries, be cautious when working with them.
4. Tips and compliant tools could be damaged by collision. Always check the robot paths before setting it to automatic operation mode.
5. Compliant tools could be damaged by severe bouncing of the tips on the workpiece. Always perform checks before setting it to automatic operation mode.
6. The air supplied to the precision regulator and compliant force should NOT be lubricated, otherwise, the compliant tools will be damaged.
7. The noise from the deburring operation could damage your hearing, always wear ear protection during work.
8. The file should only contact the workpiece from its side. Any contact in a direction other than the compliant direction, including the tip or the non-compliant side, will result in damage to the mechanism and is not covered under warranty.

Appendix

Model		LRC300S	LRC300M	LRC300L
Compliant Stroke	(mm)	Axial 5mm, Radial 5°		
Compliant Force	(N)	13~32	15~38	12~30
Compliant Pressure	(MPa)	0.2~0.5 (2~5bar)		
Air Supply	(MPa)	≥0.6 (6bar)		
Air Consumption	(LPM)	Compliance Force: Negligible		
		Pneumatic Spindle: 510		
Lubricant	(drops/min)	1-2 (Only for pneumatic spindle)		
Pneumatic Spindle Speed	(rpm)	16,000		
Collet Size	(mm)	Ø6 Milling Cutter		
Ambient Temperature	(°C)	+5~35		
Ambient Humidity	(%)	<95		
Weight	(kg)	4.2	4.4	4.7

*1. The CENTER POINT may not align exactly with the designed position. A tolerance or gap smaller than 0.5mm is normal.

*2. Please contact your supplier to obtain the 3D and 2D drawings of the compliant tool, or download them from our website.

*3. It is recommended to begin with the designed dimensions and then use the four-point calibration method to refine the TCP accuracy. When implementing the four-point calibration method, use a sharp dummy tip to indicate the desired TCP point.

*4. The robot can either hold the workpiece or the tool, depending on system integration requirements.