

Manual

San Francisco Industrial™

Installation and Service Manual

Table of Contents

<u>Subject</u>	<u>Page</u>
1. Product Range	
1.1. Toodle Configurations	1
1.1.1 Toodle Blue 131	2
1.1.2 Toodle Blue 131-90°	3
1.1.3 Toodle Blue 131-360°	4
1.1.4 Toodle Green 131	5
1.1.5 Toodle Green 131-90°	6
1.1.6 Toodle Green 131-360°	7
1.2. Replacement Kit (RK)	8
1.2.1. Bearings	9
1.2.2. Turbines	10
1.2.3. RK for 3 [mm] tool shanks	11
1.2.2 RK for 4 [mm] tool shanks	12
1.2.3 RK for 6 [mm] tool shanks	13
1.3. Accessories	22
1.3.1. Pressure Gauge	23
1.3.2. Assembly device	24
2. <u>General Information</u>	25
2.1. Safety Instructions	26
2.2. Routine Inspection	27
2.3. Maintenance	28
2.4. Storing	29
2.5. Materials	30
3. <u>Assembly and Operation Instructions</u>	31
3.1. Tool assembly	32
3.2. Toodle assembly	34
3.3. Tool holder assembly	36

1.1 – Toodle Configurations

Toodle models are available which may be driven by any of the following media:

- Emulsion
- Oil
- Air Mist

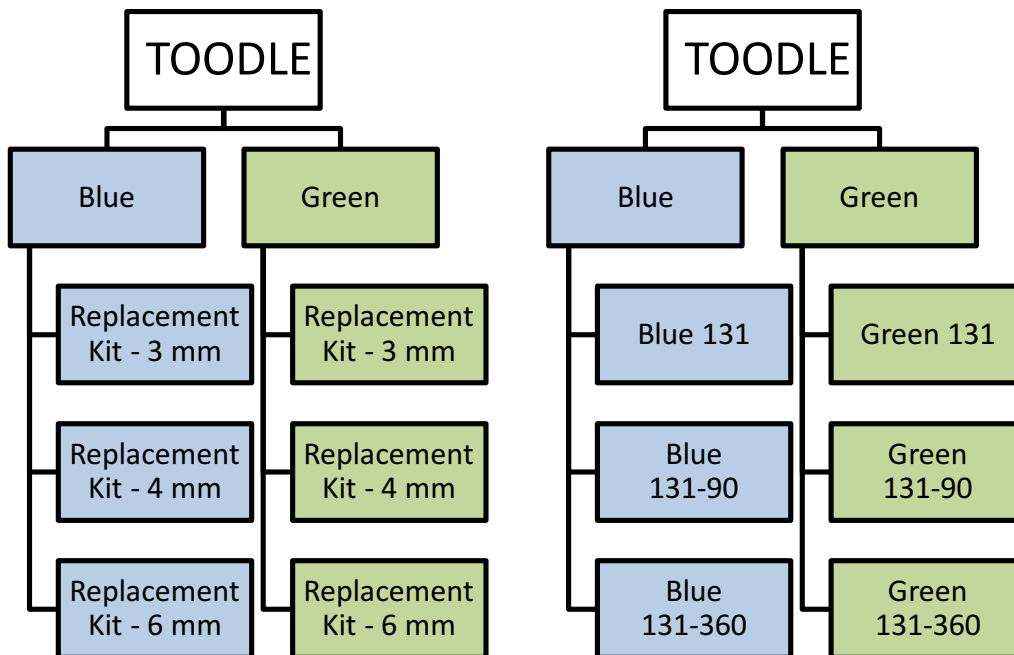
Toodle Blue models – driven by either Emulsion or Oil

10 bar coolant flow provides for rotation speeds of 40,000 rpm

60 bar coolant flow provides for rotation speeds of 70,000 rpm

Toodle Green models – driven by Air Mist

4.5 – 5.5 bar air flow provides for rotation speeds of 55,000 rpm



2. General Information

2.1. Safety Instructions

2.1.1 - Safety Instructions for tool assembly:

2.1.1.1 – The operator must use the SFI assembly device. Never use a device not supplied from SFI.

2.1.1.2 – The tool assembly includes the cutting bit. Be aware of the cutting edge.

2.1.1.4 – Beware while press fit assembling of the bearing and turbine.

2.1.1.5 – Assure not to drop the tool assembly while removing it from the assembly device.

2.1.1.6 – Do not re-use the turbines or bearings.

2.1.1.7 – Do not remove the turbine and bearings from a cutting bit.

2.1.2 – Safety Instructions during assembly procedure of the Toodle inside the tool holder.

2.1.2.1 – Clean Internal diameter of the tool holder and external diameter of Toodle before assembling.

2.1.2.2 – Use a sealed tool holding system.

2.1.2.3 – Use cylindrical collets only, like hydraulic chuck or ER systems.

2.1.2.4 – Use moderate force while closing the collet, in order to extend Toodle life.

2.1.2.5 – Closing Torque for ER 40 collet should be 175 [Nm] or higher. The axial force upon the Toodle due to 40 bar is 2,000 [N].

2.1.2.6 – During initial run (implementation of emulsion pressure) place the tool holder with Toodle near the machine table in order to avoid safety issues. In case the Toodle is not properly locked, there may be axial movement between Toodle and tool holder, but no damage will be present.

2.1.3 – General safety instructions

2.1.3.1 – Do not touch the cutting tool during rotation, and do not attempt to stop the tool rotation.

2.1.3.2 – Do not change replacement kits while the tool holder is clamped in the main spindle.

2.1.3.3 – Do not attempt to operate the Toodle while the machine door is open.

2.1.3.4 – Follow machine instructions at all times (specifically while operating the Toodle).

2.1.3.5 – Only authorized Toodle operators are authorized to operate the Toodle.

2.1.3.6 – Do not place your hand or other organs in front of the Toodle while in operation.

2.1.3.7 – Before daily operation, inspect Toodle parts status and perfection.

2.1.3.8 – Avoid inhalation of the emulsion, oil or air during operation. Use a face mask while operation the Toodle.

2.1.3.9 – Follow general safety instructions while operating the Toodle – use protecting glasses, work shoos and gloves.

2.1.3.10 – Avoid loose long hair.

2.1.3.11 – Avoid long necklaces and other jewelry.

2.1.3.12 – Use common sense at al times.

2.2 - Routine Inspections

2.2.1 – Daily Inspections

2.2.1.1 – Check machine filters.

2.2.1.2 – Check machine’s pump pressure near the pump using machine integrated pressure gauge.

2.2.1.3 – Check pressure at tool holder (main spindle end) using the SFI Pressure Device.

2.2.1.4 – Check media status – clean filter, oil percentage and coolant temperature.

2.2.1.5 – When using Toodle Green, check the lubricating oil level.

2.2.1.6 – When using Toodle Green, check air pressure in the supply line.

2.2.1.7 – When using Toodle Blue, check coolant level in the tank. Fill as required.

2.2.1.8 – Inspect Toodle parts for cracks, fractures or distortions.

2.2.1.9 – Inspect Toodle parts for corrosion marks, and remove if needed.

2.2.1.10 – Check machine general safety conditions.

2.2.1.11 – Inspect tool holder condition.

2.2.2 – Hourly Inspections

2.2.2.1 – Coolant (emulsion or oil) temperature.

2.2.2.2 – Emulsion or oil dust in machine surroundings.

2.2.2.3 – Tool status.

2.2.2.4 – Cutting surface quality.

2.2.2.5 – Change in the noise level.

2.2.2.6 – Static run out of new tool (outside the machine).

2.2.2.7 – Radial and Axial tool edge position (set point).

2.2.2.8 – Sufficient emulsion or oil flow rate from Toodle exhaust.

2.3 – Maintenance

2.3.1 – Clean Toodle parts after each use.

2.3.2 – Apply maintenance oil to the Toodle parts before storing.

2.3.3 – Clean machine filters every day.

2.3.4 – Remove corrosion marks from stainless steel Toodle parts.

2.3.5 – A used tool assembly in good condition should be clean and oiled before storing. Do not attempt to disassemble the turbine or bearings from cutting tool.

2.4 – Row Materials

2.4.1 – Turbine row material – POM H

2.4.2 – Bearings – Stainless Steel

2.4.3 – Toodle housing – Martensit Stainless Steel

2.4.4 – Front Cover – Austenit Stainless Steel

2.4.5 – Rear Cover – Austenit Stainless Steel

2.4.6 – Other supporting Toodle parts – Austenit Stainless Steel

2.4.7 – O-Rings – NBR

3. Assembly and Operation Instructions

3.1. - Tool assembly

3.1.1 – Use SFI Assembly Devices only.

3.1.2 – Insert two bearings and turbine into the assembly device according to the following order: Bearing – Turbine – Bearing.

3.1.3 – Bearings assembly directions have no importance.

3.1.4 – Turbine assembly direction is extremely important. Wrong direction of the turbine will cause improper output power and torque – Pay attention to the turbine direction.

3.1.5 – Turbine direction – Cone goes first – see assembly drawings.

3.1.6 - Insert cutting tool edge first – see assembly drawings.

3.1.7 – The distance between tool rear edge and rear bearing edge should be smaller or equal to 4 mm.

3.1.8 – If the distance between tool edge and rear bearing edge will be longer than 4 mm, friction contact between the cutting tool and Toodle rear cover will cause the system damage.

3.1.9 – Pay attention to the cutting tool bit (cutting edge) during press fit.

3.1.10 – Remove the Tool Assembly (cutting tool, bearings and turbine) out from the Assembly Device carefully.

3.1.11 – Pay special attention to the cutting tool bit (cutting edge) while removing the Tool Assembly.

3.2.- Rear Cover assembly

3.2.1 - Normally, there is no need to open the rear cover.

3.2.2 – In case that the rear bearing is stuck inside the Toodle during Tool Assembly removal, it is essential to disassemble the rear cover in order to remove the rear bearing from inside the Toodle housing. In order to disassemble the rear cover it is necessary to remove the Toodle from the tool holder first.

3.2.3 – In order to assemble or disassemble the rear cover use a special tool (as snap rings pliers)

3.2.4 – To remove the rear cover, turn it counter clock wise (CCW).

3.2.5 – To assemble the rear cover, turn it clock wise (CW).

3.2.6 – Before rear cover assembly pay attention to the O-Ring seal. Change the O-Ring as necessary.

3.2.7 – Before rear cover assembly, pay attention to corrosion marks. Clean corrosion marks as necessary.

3.2.8 – Before rear cover assembly, clean the Toodle.

3.2.9 – During assembling procedure do not use extended force, only manual torque (25 to 40 Nm).

3.2.10 – After assembly procedure of the rear cover, pay attention to the rear cover position comparing to the housing – see drawing.

3.3.- Toodle assembly inside the Tool Holder

3.3.1 – Before Assembling the Toodle inside the tool holder, make sure that the Toodle is fully assembled, including rear cover and front cover (Tool Assembly is not mandatory).

3.3.2 – The front cover helps to define the Toodle's position in relation to the tool holder.

3.3.3 – Before assembly, clean the tool holder internal diameter.

3.3.4 – Before assembly, clean Toodle external diameter.

3.3.5 – Before assembly, pay attention to corrosion marks on the tool holder, and Toodle. Remove any corrosion marks.

3.3.6 – Before assembly, pay attention to the Toodle's Jets. Assure they are all clean and open. Clean the Jet's with a small needle if necessary (1.4 mm or 0.055 in)

3.3.7 – When using Toodle Green 131, pay attention to the external O-Ring seal. Change the O-Ring as necessary.

3.3.8 - Use moderate torque to clamp the Toodle into the Tool Holder. The torque should be as recommended by the tool holder manufacturer. In case of low torque levels the Toodle might disconnect from the tool holder due to the high pressure. Therefore it is extremely important (safety issues) to apply at least the minimum required torque.

3.3.9 – Extensive torque (radial force) upon the Toodle may cause radial distortion of the Toodle housing. Therefore, it is important to apply clamping force according tool holder recommendations as function of hydraulic pressure.

3.3.10 – Each time the Toodle is removed from the tool holder and inserted again, the operator must test run full pressure (coolant, oil, or air) through the system. Place the Toodle front near the horizontal table to avoid any unnecessary damage or injury.

3.3.11 – In case of Replacement Kit change, it is not necessary to remove the Toodle out of the tool holder, Just open the front cover and pull out the Tool Assembly.

3.4. - Tool replacement

3.4.1 – When replacing the tool with a new, the operator must replace the bearings and turbine with new as well.

3.4.2 – In order to change the Replacement Kit, remove the front cover and pull out the Tool Assembly.

3.4.3 – In case that the rear bearing is stuck inside the Toodle housing, it is essential to remove the Toodle from the tool holder and after remove the rear cover.

3.4.4 – Normally, the rear bearing may be easily removed together with the tool, turbine and front bearing.

3.4.5 – Carefully place the new Tool Assembly inside the Toodle, and tighten the front cover.

3.4.6 – Before assembly of the front cover, assure the O-Ring is in the designated slot.

3.4.7 – Do not use extensive force (torque) to tighten the front cover. No hammer nor extension tube is necessary.

3.4.8 – After front cover closing, rotate the cutting tool with your fingers and make sure it turns freely.

Bearings adjustment to Tool core												
Tool Core dimension					Bearings and Tools Clearances							
Dia' [mm]	Tol'	Tol. Field	Min [mm]	Avg [mm]	Max [mm]	Class4 (P4) ABEC7		Class5 (P5) ABEC5		Class6 (P6) ABEC3		Match Quality
						Min	Max	Min	Max	Min	Max	
3	h3	0.002	2.998	2.999	3	- 4 to 2		- 5 to 2		- 7 to 2		Perfect
	h4	0.003	2.997	2.9985	3	- 4 to 3		- 5 to 3		- 7 to 3		Perfect
	h5	0.004	2.996	2.998	3	- 4 to 4		-5 to 4		-7 to 4		V. Good
	h6	0.006	2.994	2.997	3	- 4 to 6		- 5 to 6		- 7 to 6		Good
	h7	0.01	2.99	2.995	3	- 4 to 10		- 5 to 10		- 7 to 10		Fair
	h8	0.014	2.986	2.993	3	- 4 to 14		-5 to 14		-7 to 14		Poor
4	h3	0.0025	3.9975	3.9988	4	- 4 to 2.5		-5 to 2.5		-7 to 2.5		Perfect
	h4	0.004	3.996	3.998	4	- 4 to 4		-5 to 4		-7 to 4		V. Good
	h5	0.005	3.995	3.9975	4	- 4 to 5		-5 to 5		-7 to 5		V. Good
	h6	0.008	3.992	3.996	4	- 4 to 8		-5 to 8		-7 to 8		Good
	h7	0.012	3.988	3.994	4	- 4 to 12		-5 to 12		-7 to 12		Poor
	h8	0.018	3.982	3.991	4	- 4 to 18		-5 to 18		-7 to 18		Poor
6	h3	0.0025	5.9975	5.9988	6	- 4 to 2.5		-5 to 2.5		-7 to 2.5		Perfect
	h4	0.004	5.996	5.998	6	- 4 to 4		-5 to 4		-7 to 4		V. Good
	h5	0.005	5.995	5.9975	6	- 4 to 5		-5 to 5		-7 to 5		V. Good
	h6	0.008	5.992	5.996	6	- 4 to 8		-5 to 8		-7 to 8		Good
	h7	0.012	5.988	5.994	6	- 4 to 12		-5 to 12		-7 to 12		Poor
	h8	0.018	5.982	5.991	6	- 4 to 18		-5 to 18		-7 to 18		Poor
Bearing's inner ring tolerance [microns]												
Tolerance		Class 4	Class 5	Class 6	Dynamic Run-Out [micron]							
		0 to -4	0 to -5	0 to -7	Class 3	Class 4	Class 5	Class 6	Normal			
3	Min	2.996	2.995	2.993	0	0.5	1	2	4			
	Max	3.000	3.000	3.000	1.5	2.5	4	6	10			
4	Min	3.996	3.995	3.993	0	0.5	1	2	5			
	Max	4.000	4.000	4.000	1.5	2.5	4	6	10			
6	Min	5.996	5.995	5.993	0	1	1	2	5			
	Max	6.000	6.000	6.000	1.5	3	4	6	12			