Instruction Manual

for

ULTRAMAX®

Models: DF and SF

500-0200, 500-0210, 500-0211

Gesswein®
The Right Tools Since 1914

1. Introduction

Please read this instruction manual thoroughly before using your ULTRAMAX.

For more than two decades, Gesswein has brought the benefits of ultrasonic polishing and finishing to mold and diemakers. Manual polishing can't compete with the ease of use, quality of results or time savings of using ultrasonic energy with conventional abrasive tools. As the recognized leader in the field, Gesswein continues to bring you the best that technology has to offer.

With 45 watts of output power, our DF and SF units are unaffected by metal hardness. Even the toughest metals, including tungsten carbide and titanium, are no match. Everything from milled surfaces to rough EDM surfaces can be polished to a mirror finish using all grades of finishing stones, sintered, resin and plated diamond tools, files and ceramic stones as well as metallic and nonmetallic lapping tools with diamond compound.

ULTRAMAX DF and SF compact power packs operate the UF-9700 ultrasonic handpiece. Additionally, ULTRAMAX DF can operate any one of 12 Power Hand 2X 30V DC mechanical handpieces.

Control panel layout is easy to read and employs large power control touch pads. Output power (DF and SF) and mechanical handpiece speed (DF only) are controlled by these touch pads, an optional Variable-Speed Foot Rheostat or an optional On/Off Foot Switch. Built-in protection circuitry prevents damage to both the UF-9700 ultrasonic handpiece and Power Hand 2X mechanical handpieces.

Note: Because the new ULTRAMAX DF and SF units provide greater output power, it is important to follow the instructions on proper usage of clamp tools, found later in this manual.

Ultramax DF

Ultramax SF

DF/SF components

2. Features

1. Increased maximum output power of 45W
2. Broader operating frequency range of 20.0-30.0kHz
3. Greater tool amplitude range of 4-40 microns
4. Regulated power feedback for automatic output power reduction
5. Tool control touch pads for ordinary tools and clamp tools
6. Steady power and tool amplitude settings
7. Increased torque for all Gesswein Power Hand 2X 30V DC mechanical handpieces*
8. Instant rotary handpiece reversing switch for improved handling on edges, corners and radius surfaces*
9. Electronic feedback circuitry for maintaining speed of rotary handpiece with increased pressure on the work surface*
10. Motor overload protection for all Power hand 2X handpiece armatures*

*ULTRAMAX DF only.

3. Specifications

Power Pack

Model	ULTRAMAX DF	ULTRAMAX SF
Electrical	115 or 230V, 50/60Hz	115 or 230V, 50/60Hz
Frequency (range)	24kHz (20.0-30.0kHz)	24KHz (20.0-30.0khz)
Amplitude (stroke)	4-40 microns	4-40 microns
Frequency Adjustment	Auto feedback system	Auto feedback system
Ultrasonic Power Output	45W maximum	45W maximum
Power Hand 2X Output	0-30V DC	N/A
Output Adjustment (power and stroke)	Continuously variable	Continuously variable
Power Source	115V, 1 Ph, 50/60Hz (230V available)	115V, 1 Ph, 50/60Hz (230V available)
Power Consumption	200VA	100VA
Dimensions	6 3/8"W x 11"D x 8 1/4"H	7"W x 8 1/4"D x 6"H
Net Wt.	8 lbs.	5 lbs.

Ultrasonic Handpiece

Model	UF-9700
Transducer	B.L.T. electrostrictive
Cable Length	2.0m (curl cord)
Screw Thread	M6; M4 with adapter
Dimensions	5"L x 9/16" dia. tapered to 13/32"
Net Wt.	4.5 oz.

4. Accessories*

- UF-9700 Ultrasonic Handpiece
- Wooden Handpiece Case
- Handpiece Rest
- Power Cord
- Replacement Fuse
- Plastic Tool Box
- Cloth Tool Holder
- Flat Diamond File, 1T x 5W x 133L, #200
- Flat Diamond File, 1T x 5W x 133L, #320
- Chisel Diamond File, 0.5T/1W x 4W x 44L, #200
- Chisel Diamond File, 0.5T/1W x 4W x 44L, #320
- Flat Diamond Stone, 1T x 3W x 41L, #200
- Flat Diamond Stone, 1T x 5W x 41L, #200
- Flat Diamond Stone, 1.5T x 6W x 80L, #200
- Flat Resin-Bonded Diamond Stone, 3T x 6W x 22L, #200
- Flat Resin-Bonded Diamond Stone, 3T x 6W x 22L, #320
- Flat Ceramic Stone Tool, 0.8T x 4W x 40L, #600
- Flat Ceramic Stone Tool, 0.8T x 4W x 40L, #800
- Flat Ceramic Stone Tool, 1T x 6W x 40L, #600
- Flat Ceramic Stone Tool, 1T x 6W x 40L, #800
- Round Ceramic Stone Tool, 3D x 30L, #600
- Round Ceramic Stone Tool, 3D x 30L, #800
- Flat Wood Lapping Tool, 3.2T x 6W x 30L
- Round Wood Lapping Tool, 3D x 30L
- Clamp Tool Holder (M6) for 0.8T Flat
- Clamp Tool Holder (M6) for 1.1T Flat
- Clamp Tool Holder (M6) for 3.1T Flat
- Clamp Tool Holder (M6) for 3.3T Flat
- Clamp Tool Holder (M6) for 3.2D Round
- Tool Adapter (M6 to M4)
- Wrench (M8)
- Wrench (M10)
- Wrench (M13)
- Allen Key (M2.5)
- Small Protector Sleeve for UF-9700
- Beveled Protector Sleeve for UF-9700
- Earplugs

*Measurements in mm.

Optional Accessories

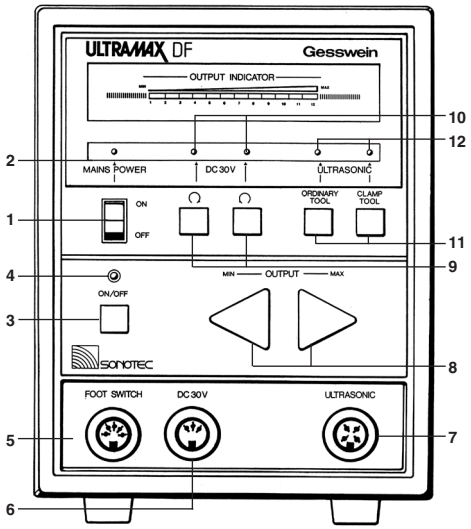
Contact Gesswein for information on the complete line of tool accessories and Power Hand 2X mechanical handpiece options.

5. Parts Nomenclature

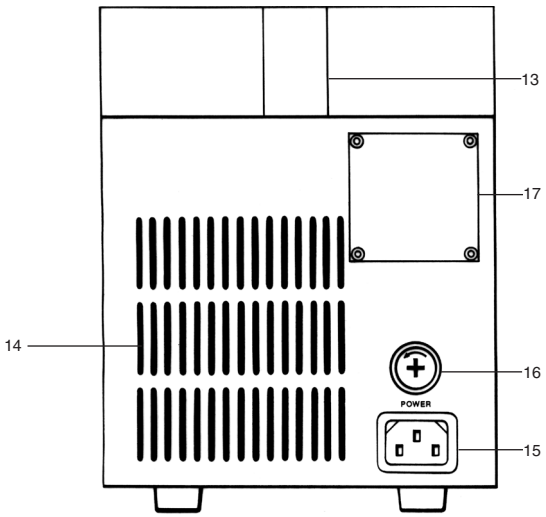
5.1 ULTRAMAX DF Power Pack

1. Main Power Switch
2. Main Power Indicator Lamp
3. On/Off and Reset Switch
4. On/Off Pilot Lamp
5. Output Socket for optional foot rheostat/switch
6. 30V DC Output Socket for Power Hand 2X handpiece
7. Output Socket for UF-9700 ultrasonic handpiece
8. Output Power Control Touch Pads
9. Power Hand 2X Selector Switches:
   - Forward Rotation
   - Reverse Rotation
10. Power Hand 2X Function Pilot Lamps
11. Ultrasonic Selector Switches:
    - Ordinary Tool
    - Clamp Tool
12. Ultrasonic Function Pilot Lamps
13. Carrying Handle
14. Ventilation Grills
15. Input Power Socket
16. Fuse Holder/Fuse
17. Specifications and Serial Number Plate

Front Panel



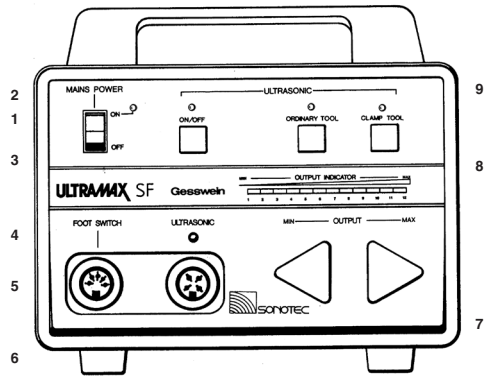
Rear Panel



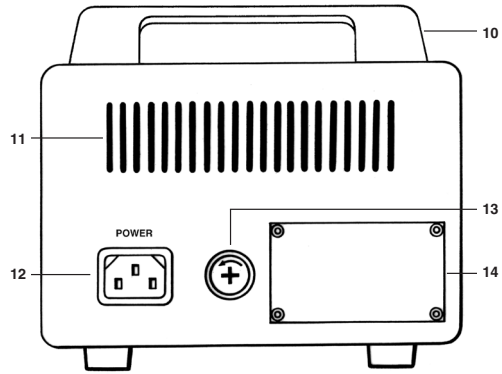
5.2 ULTRAMAX SF Power Pack

1. Main Power Switch
2. Main Power Indicator Lamp
3. On/Off and Reset Switch
4. On/Off Pilot Lamp
5. Output Socket for optional foot/rheostat switch
6. Output Socket for UF-9700 ultrasonic handpiece
7. Output Power Control Touch Pads
8. Ultrasonic Selector Switches:
   - Ordinary Tool
   - Clamp Tool
9. Ultrasonic Function Pilot Lamps
10. Carrying Handle
11. Ventilation Grills
12. Input Power Socket
13. Fuse Holder/Fuse
14. Specifications and Serial Number Plate

Front Panel



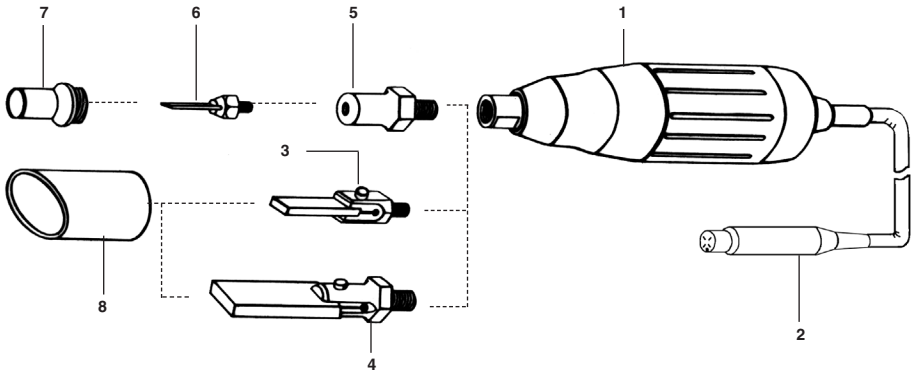
Rear Panel



5.3 UF-9700 Ultrasonic Handpiece

The UF-9700 ultrasonic handpiece accepts 6mm threaded tools and Clamp Tool Holders. Additionally, 4mm threaded tools (but not 4mm Clamp Tool Holders) can be used with a 6/4mm Tool Adapter.

Note: Use only 6mm Clamp Tool Holders with the UF-9700 handpiece. Do not twist or bend the UF-9700 cord sharply.



1. UF-9700 Ultrasonic Handpiece
2. UF-9700 Control Panel Plug Connector
3. Medium Clamp Tool Holder
4. Large Clamp Tool Holder
5. 6/4mm Tool Adapter
6. 4mm Threaded Tool
7. Small Protector Sleeve
8. Beveled Protector Sleeve

Note: The UF-9700 is a sealed unit. To protect your warranty, do not attempt to dismantle.

6. General Description of Use

6.1 Function

Electric power to ULTRAMAX units is supplied from a 115V AC* source. ULTRAMAX DF and SF power packs convert this power source to a 24kHz electrical signal. The signal is sent to the UF-9700 ultrasonic handpiece, which converts it to mechanical reciprocating motion.

ULTRAMAX DF also converts the AC power source to direct current (30V DC). Required power is automatically supplied to Gesswein Power Hand 2X 30V DC mechanical handpieces according to the speed setting selected.

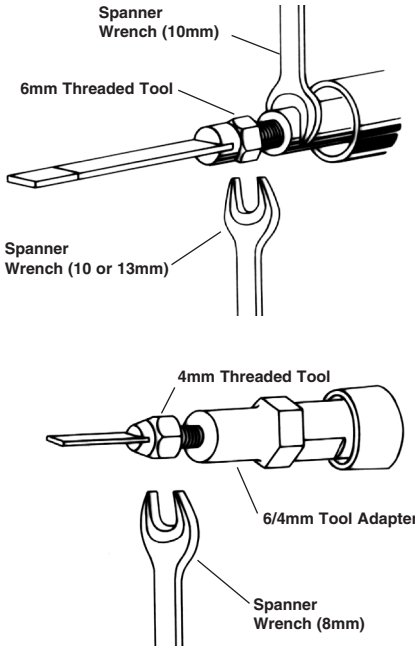
Since ULTRAMAX DF is specifically designed to function with Power Hand 2X 30V DC handpieces, it cannot be used with Power Hand 20V DC handpieces or other makes of handpieces.

*230V AC models available.

6.2 Attachment of Tools to UF-9700 Ultrasonic Handpiece

Fasten 6mm threaded tools directly to the UF-9700 handpiece. Use 10 or 13mm spanner wrenches as illustrated to tighten tools securely.

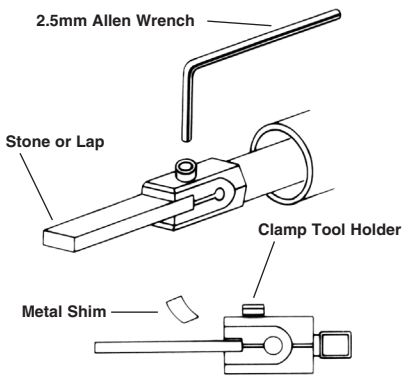
To use 4mm threaded tools in the UF-9700 handpiece, first attach the 6/4mm Tool Adapter using 10mm spanner wrenches, then fasten tools to the adapter with an 8mm spanner wrench as illustrated. Do not over tighten.



Use a Clamp Tool Holder for finishing stones, resin-bonded diamond stones, ceramic stones and laps.

Fasten Clamp Tool Holders directly to the UF-9700 handpiece. Use 10mm spanner wrenches to tighten holders securely. Use only 6mm Clamp Tool Holders. Do not use 4mm holders – they will damage the UF-9700 handpiece.

Firmly secure the stone or lap in the Clamp Tool Holder with a 2.5mm Allen wrench. If the tool thickness or diameter is undersized, do not compensate by over tightening. Use a metal shim as illustrated.



Note: To obtain the best reciprocation frequencies, threaded and clamp tools and tool holders must be securely fastened. Loose connections will cause reduced power output. To ensure maximum tool efficiency, all male and female tool threads and all tool shoulders and interfaces must be kept clean and true (see Operational Precautions section).

6.3 Ultrasonic Tool Usage

A wide range of threaded and clamp-type tools and tool holders is supplied with each ULTRAMAX unit. Additional tools and tool holders are available separately.

Ordinary Tools

Ordinary tools include all Gesswein ultrasonic tools except those used in Clamp Tool Holders. Gesswein ordinary factory premounted tools are made to match the resonant frequency of ULTRAMAX DF and SF. The manufacturer does not accept any liability for other manufacturers' tools.

When using Ordinary Tools, depress the "ORDINARY TOOL" selector switch on the front panel of the ULTRAMAX DF and SF. Selecting "ORDINARY TOOL" provides maximum cutting power.

Operational Hints for Ordinary Tools

- Do not apply excessive pressure on the tool. ULTRAMAX DF and SF polish best when only a small amount of pressure is applied. The more pressure applied to the work surface, the less cutting power.
- Do not use highly viscous lubricants when polishing – they reduce ultrasonic vibration and cutting power. Use Gesswein Stoning and Lubricating Oil for best results.
- A high-pitched noise indicates a loose connection or bent tool.

Color Coding for Ordinary Tools

All Gesswein ultrasonic tools except abrasive stones are color-coded as indicated in the chart below.

Color	Grit	Micron
Red	200	68
Black	320	40
Blue	500	35
White	600	28
Green	1000	15

Clamp Tools

Clamp tools include any and all tools, abrasives and laps secured by means of a Clamp Tool Holder. Gesswein Clamp Tool Holders are made to match the resonant frequency of ULTRAMAX DF and SF. The manufacturer does not accept liability for other manufacturers' holders.

When using clamp tools, depress the "CLAMP TOOL" selector switch on the front panel of the ULTRAMAX DF or SF. Selecting "CLAMP TOOL" cuts power output to provide efficient polishing motion. "CLAMP TOOL" mode eliminates the excessive heat buildup that causes abrasive stones to break down and wood laps to burn.

Operational Hints for Clamp Tools

- Use only 6mm Clamp Tool Holders. Do not use 4mm holders – they will damage the UF-9700 handpiece.
- Do not apply excessive pressure on the tool. ULTRAMAX DF and SF polish best when only a small amount of pressure is applied. The more pressure applied to the work surface, the less cutting power.
- Do not use highly viscous lubricants when polishing – they reduce ultrasonic vibration and cutting power. Use Gesswein Stoning and Lubricating Oil for best results.
- If an abrasive stone breaks in its holder, apply less pressure on the work surface and/or reduce output power. If a wood lap begins to burn, reduce output power.
- To maintain maximum cutting power, periodically retighten the cap screw on the Clamp Tool Holder during use as the abrasive wears and loosens slightly in the holder.
- When making your own clamp tools, refer to recommended sizes listed below for some commonly used materials.

Recommended Sizes for Clamp Tools

Material	Profile (mm)	Recommended Length (mm)	
Wood	3ø	Below 40	Above 70
	3 x 6	40	80
	3~5 x 15	30	80
Brass	2ø	30	50
	3ø	20	60
	2 x 2~8	35	60
Abrasive Stone	1.5~3 x 6~15	25	80
Ceramic Stone	2~3ø	30	60
	0.8~2 x 4~10	40	60

Important: When using clamp tools, make sure "CLAMP TOOL" selector switch is depressed.

6.4 Commissioning

UF-9700 Ultrasonic Handpiece (DF/SF)

A. Select an ultrasonic tool and tightly secure in the UF-9700 handpiece. Connect UF-9700 to Ultrasonic Output Socket on ULTRAMAX DF/SF.

B. Check to ensure single-phase voltage available is the same as that marked on the Specification Plate located on the ULTRAMAX DF/SF rear panel. Connect the ULTRAMAX DF/SF power cable to the main power supply, and turn Main Power Switch on. The Main Power Indicator Lamp lights up.

C. Depress the "ORDINARY TOOL" Selector Switch to use ordinary factory premounted tools. Depress the "CLAMP TOOL" Selector Switch to use tools mounted in Clamp Tool Holders.

D. Use the Output Power Control Touch Pads on the front panel of your ULTRAMAX DF/SF to adjust output power (and tool amplitude).

Note: Tool amplitude increases from 4 microns at the MIN Output Indicator setting to 40 microns at the MAX setting.

E. With output power selected, push On/Off and Reset Switch on. The On/Off Pilot Lamp lights up. Providing all equipment has been connected as directed, your UF-9700 handpiece should now be operational.

Note: For suggestions on output power selections, see Ultrasonic Tool section.

F. To control output power by foot control, connect the Variable-Speed Foot Rheostat or On/Off Foot Switch to the Output Socket for optional foot rheostat/switch.

G. Using the Variable-Speed Foot Rheostat precludes having to use the On/Off and Reset Switch. Depressing the foot rheostat turns the unit on (in this sense, it acts as an on/off switch). Increasing pressure on the foot rheostat increases output power (and tool amplitude). Lifting completely off the foot rheostat turns the unit off. The On/Off Pilot Lamp goes out.

H. When using the On/Off Foot Switch, first manually select an output power level, then turn the On/Off and Reset Switch on. Depressing the foot switch brings the handpiece to the selected power level. Lifting completely off the foot switch brings outback power back to the MIN setting. The On/Off Pilot Lamp stays on.

Note: To revert to manual control, follow steps C through E. The optional foot rheostat/switch need not be disconnected from the unit.

Power Hand 2X Mechanical Handpieces (DF only)

A. Select a Power Hand 2X 30V DC handpiece. Secure a tool to the handpiece, carefully following the provided instructions. Connect the handpiece to the 30V DC Output Socket on the ULTRAMAX DF front panel.

B. Check to ensure single-phase voltage available is the same as that marked on the Specification Plate located on the ULTRAMAX DF rear panel. Connect the ULTRAMAX DF power cable to the main power supply, and turn the Main Power Switch on. The Main Power Indicator Lamp lights up.

C. Use the Power hand 2X Selector Switches to select the rotational direction of the tool. Press ↻ to run in the forward direction (normal rotational direction) or ↺ to run in the reverse direction.

D. Use the Output Power Control Touch Pads on the front panel of your ULTRAMAX DF to change handpiece speed.

Note: It is recommended that power be reduced to the MIN setting at startup since the unit is preset to start the mechanical handpiece at approximately half speed (i.e., 6 or 7 LED bars on the Output Indicator).

E. With handpiece speed selected, push On/Off and Reset Switch on. The On/Off Pilot Lamp lights up. Providing all equipment has been connected as directed, your Power Hand 2X handpiece should now be operational.

F. To control output power by foot control, follow the same procedures for the UF-9700 Ultrasonic Handpiece.

Note: To revert to manual control, follow steps C through D. The optional foot rheostat/switch need not be disconnected from the unit.

7. Recommended Ultrasonic Settings

Tool Type	Output Indicator Position	Recommended Tool Application	Ultrasonic Selector Switch Choice
Ordinary Tools (6 and 4mm threaded)		Stroke: Up to 40 microns. Coarse finishing using diamond files and stones from 200 to 320 grit.	• ☑ Ordinary Tool ○ ☐ Clamp Tool
		Stroke: Up to 30 microns. Medium finishing using ruby stones and diamond tools over 320 grit.	• ☑ Ordinary Tool ○ ☐ Clamp Tool
Clamp Tools		Stroke: Up to 20 microns. Middle finishing using hard wood laps, resin-bonded diamond stones, ceramic stones and abrasive stones.	○ ☐ Ordinary Tool • ☑ Clamp Tool
		Stroke: Up to 10 microns. Super finishing using soft wood laps with diamond compound.	○ ☐ Ordinary Tool • ☑ Clamp Tool

8. Detailed Features and Safety Devices

A. On/Off and Reset Switch (DF/SF) – Automatically turns off when ultrasonic tool is improperly attached, insufficiently tightened or of the wrong size (DF/SF); automatically turns off when Power Hand 2X rotary handpiece collet release mechanism is left in the release position (DF only). To reset, attach ultrasonic tool properly or move Power Hand 2X collet release mechanism to the secure position, then turn switch on.

B. Regulated Power Feedback System (DF/SF) – Drops output power to minimum when ultrasonic handpiece is lifted from the workpiece; returns output power to last setting when ultrasonic handpiece reestablishes contact with the workpiece. Increases handpiece transducer life and keeps handpiece and tools cool during extended operation.

C. Memory function (DF/SF) – Saves the last output power setting as long as the Main Power Switch is on.

D. Angled Front Panel (DF/SF) – Ensures clear view of all controls.

E. Carrying Handle (DF/SF) – Provides portability.

F. Standard Fuse (DF/SF) – Allows easy replacement with a Phillips screwdriver. ULTRAMAX DF: 2A in 115V model, 1.5A in 230V model. ULTRAMAX SF: 1.5A in 115V model, 1A in 230V model.

G. Small and Beveled Protector Sleeves (DF/SF) – Small protects ordinary tools; beveled protects clamped tools.

H. Forward/Reverse Rotation Function (DF only) – Allows Power Hand 2X handpiece to run in forward and reverse. Brings handpiece to a complete stop before changing direction, protecting motor armature from damage.

I. Motor Overload Protection Circuitry (DF only) – Slows then stops Power hand 2X Handpiece in the event of overload. Brings handpiece back up to original speed once it is lifted from the workpiece, triggers a buzzer and turns off the On/Off and Reset Switch in the event of abnormal overload. To reset, fix problem (i.e., replace bent or broken tool), then turn on the On/Off and Reset Switch.

J. Electronic Feedback Circuitry (DF only) – Maintains Power Hand 2X handpiece speed as work force increases.

K. Electronic Transformer (DF only) – Allows reliable Power Hand 2X handpiece operation.

L. Cooling fan (DF only) – Operates continuously when Main Power Switch is on.

9. Operational Precautions

√ Use only 6mm Clamp Tool Holders with the UF-9700 handpiece. Do not use 4mm holders – they will damage the handpiece.

√ Ensure that the “CLAMP TOOL” selector switch is depressed when using clamp tools of any kind.

√ For maximum efficiency, ensure all threaded and clamp tools and tool holders are securely fastened. Loose connections will cause reduced power output.

√ Inspect tools, holders and handpiece screw threads for dirt and rust. All male and female screw threads and all tool shoulders and interfaces must be kept clean and true. Use acetone, wire scratch brush and cotton ear swabs to clean.

√ Use only Gesswein ordinary tools with the UF-9700 handpiece for maximum efficiency. If custom clamp tools are used, please refer to the chart in 6.3 for size recommendations.

√ Avoid touching tools mounted in the UF-9700 handpiece while they are ultrasonically vibrating. They may be hot enough to cause burning.

√ Do not use highly viscous lubricants. Use Gesswein Stoning and Lubricating Oil. Do not allow lubricants to enter the UF-9700 handpiece (as can occur when the handpiece is held with the tool pointing upward). Lubricant oils can penetrate into the handpiece and cause deterioration of components.

√ Protect the UF-9700 handpiece from sharp impact.

√ Protect the handpiece cable from impact, sharp objects and excessive heat. Do not twist cable or bend sharply at the strain relief.

√ For operating comfort, use the earplugs provided.

√ When in use, make sure the power pack ventilation grills located on the rear and bottom of the units are not covered or obstructed.

√ When not in use for extended periods, turn off the On/Off and Reset Switch. Doing so will prevent your mounting a tool in the UF-9700 handpiece while the unit is on.

√ Keep the power packs away from excessive heat, humidity and corrosive chemicals.

√ Always disengage handpiece and power pack by the plugs — not the cords.

Note: Gesswein cannot accept responsibility for the incorrect use of ULTRAMAX DF/SF power packs and/or UF-9700 ultrasonic handpiece.

10. Troubleshooting Chart

IMPORTANT: ULTRAMAX DF/SF power packs and UF-9700 ultrasonic handpiece are sealed units. To protect your warranty, do not dismantle.

Problem	Possible Cause	Remedy
No vibration	• Loose connection of plugs	Check
	• Switches not in correct position	Check
Low vibration	• Power output setting in MIN position	Increase power output
	• Tool or 6/4mm Tool Adapter is insufficiently secured	Fasten securely
	• Tool is too short or too long	Adjust tool length*
	• Too much pressure applied to tool	Reduce pressure
Decreased vibration during operation and/or zero vibration	• Tool or 6/4mm Tool Adapter has become unfastened	Fasten securely
	• Stone or tool broken	Replace tool and reset On/Off and Reset Switch
	• Custom tool is causing circuit overload	Replace tool and reset On/Off and Reset Switch
Abnormal noise from tool	• Loose joint or bent tool	Fasten securely or replace or straighten tool
Abrasive stone breaks or wood lap begins to burn	• "CLAMP TOOL" mode not being used	Check
	• Thickness of abrasive stone not correct	Replace tool**
	• Power output setting is too high	Reduce power output
	• Too much pressure applied on tool	Use less pressure on the tool

*See chart in 6.3.

11. Warranty

Gesswein guarantees your ULTRAMAX DF/SF will be free of defects in material and workmanship for a period of one year from date of shipment. Within the warranty period, Gesswein or the manufacturer will repair or replace defective units. All claims must be made in writing to Gesswein and must include date of purchase and serial numbers of power pack and ultrasonic handpiece.

Gesswein shall in no way be liable for:

- Damages incurred during shipment.
- Failures or damages due to misuse, abuse, improper installation or abnormal exposure to dirt, corrosives or extreme temperatures.
- Failures or damages due to operation, intentional or otherwise, above rated capacities.
- Unauthorized expenses for removal, inspection, transportation, repair or rework, as well as consequent failures or damages.
- Power packs and handpieces that have been tampered with or dismantled in any way.

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